A+

Apple II/Macintosh

THE INDEPENDENT GUIDE TO APPLE COMPUTING

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JUNE 1986
VOLUME 4
ISSUE 6

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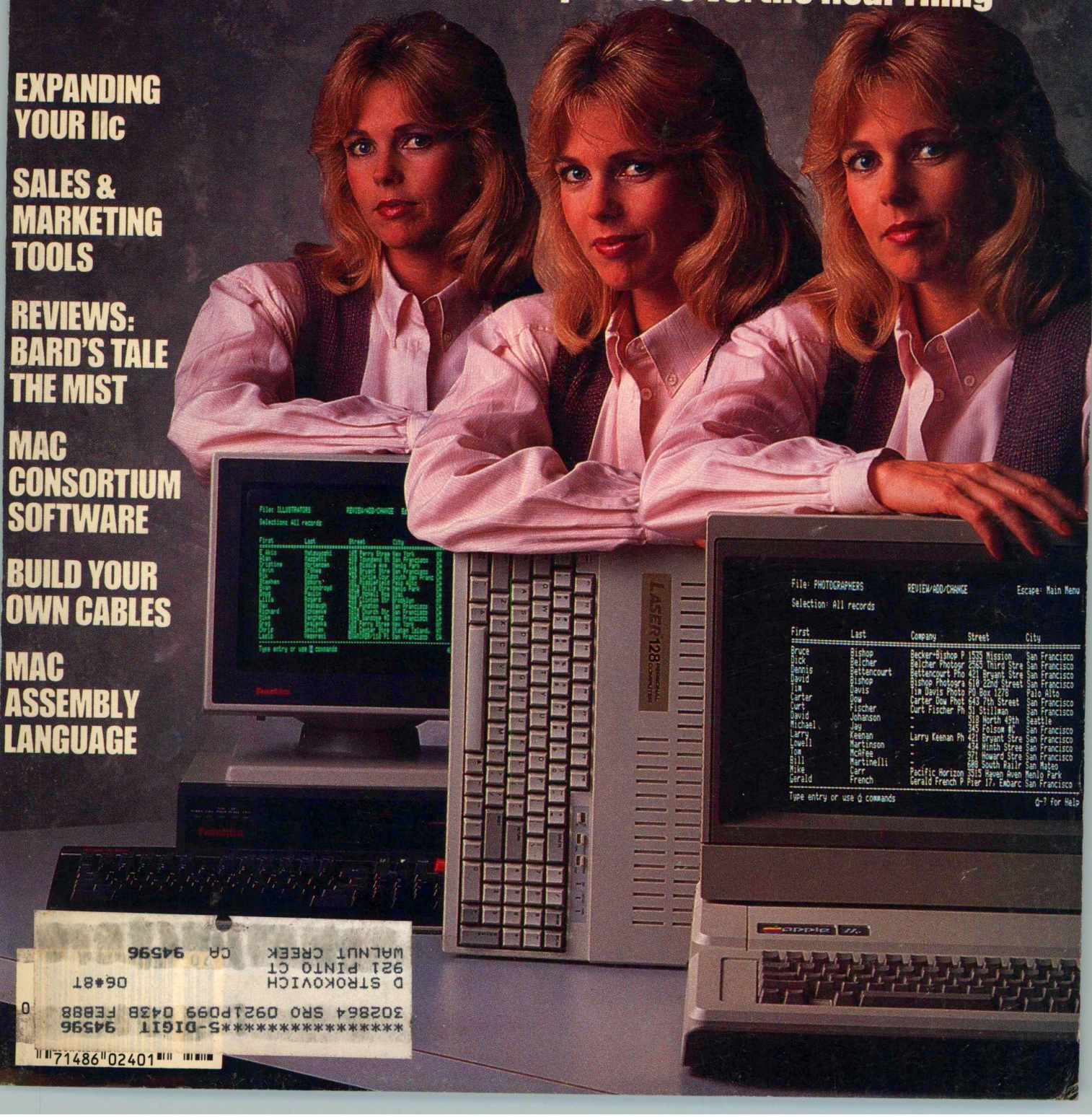

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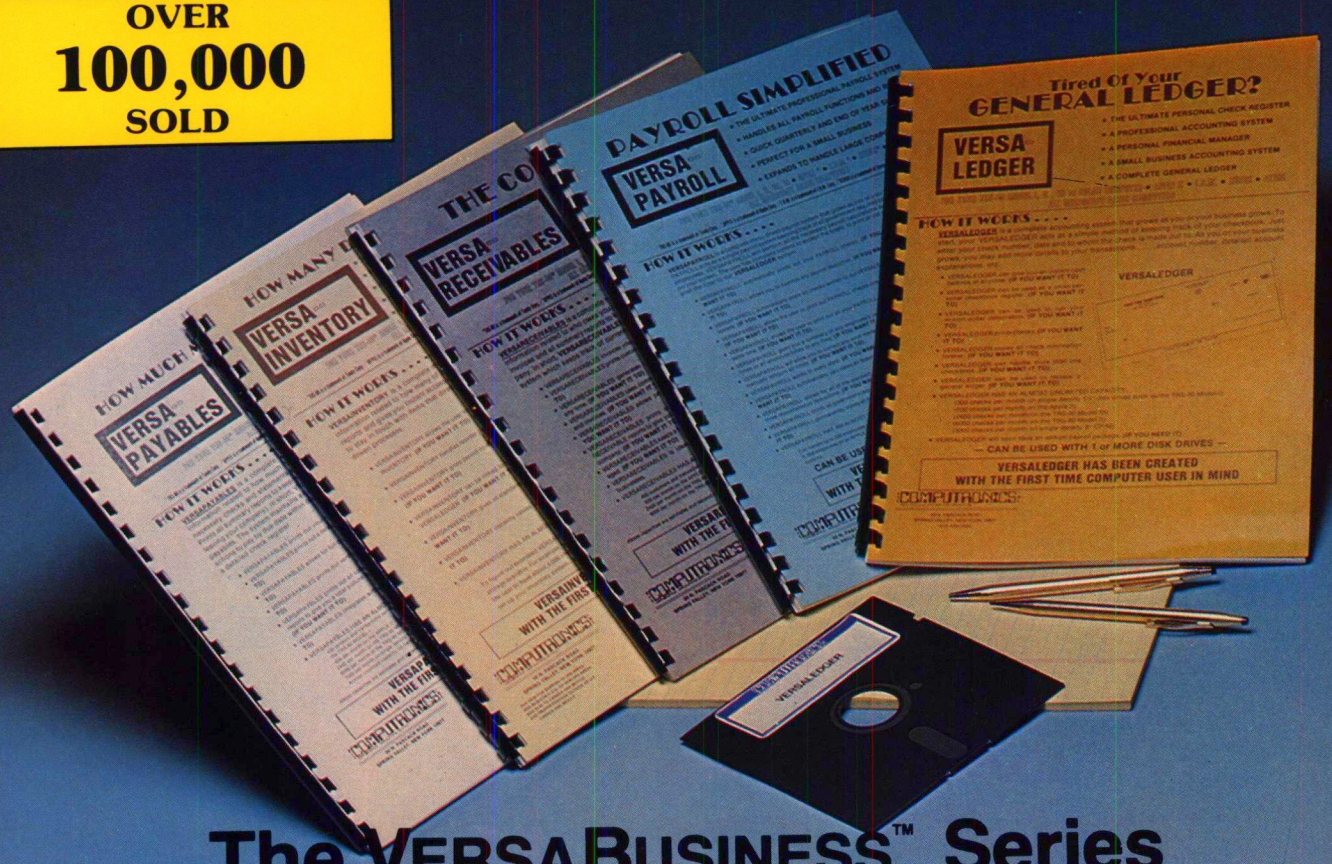

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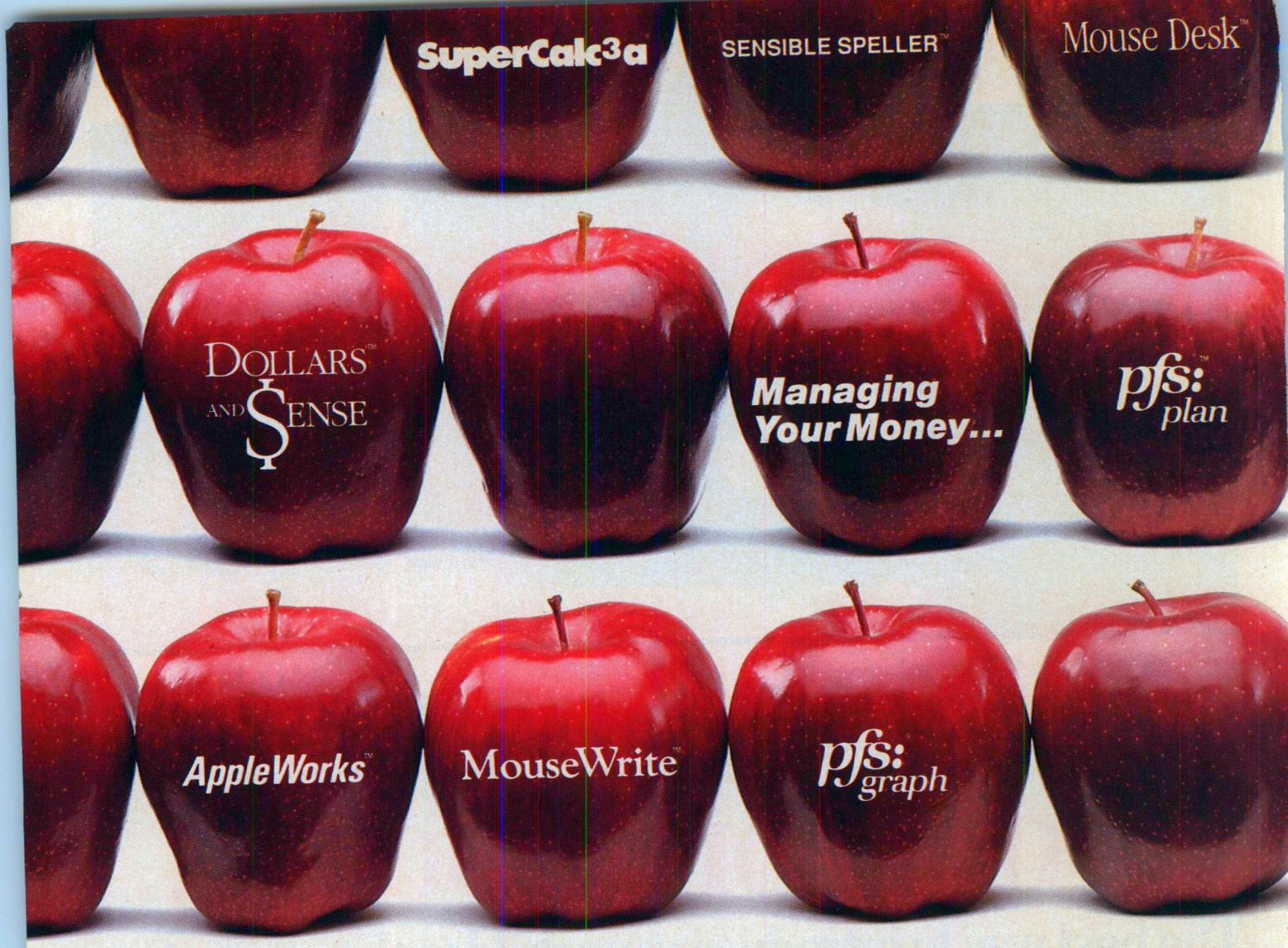

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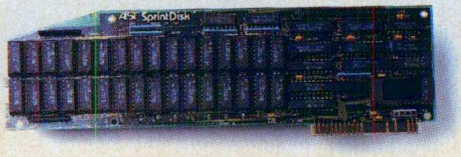

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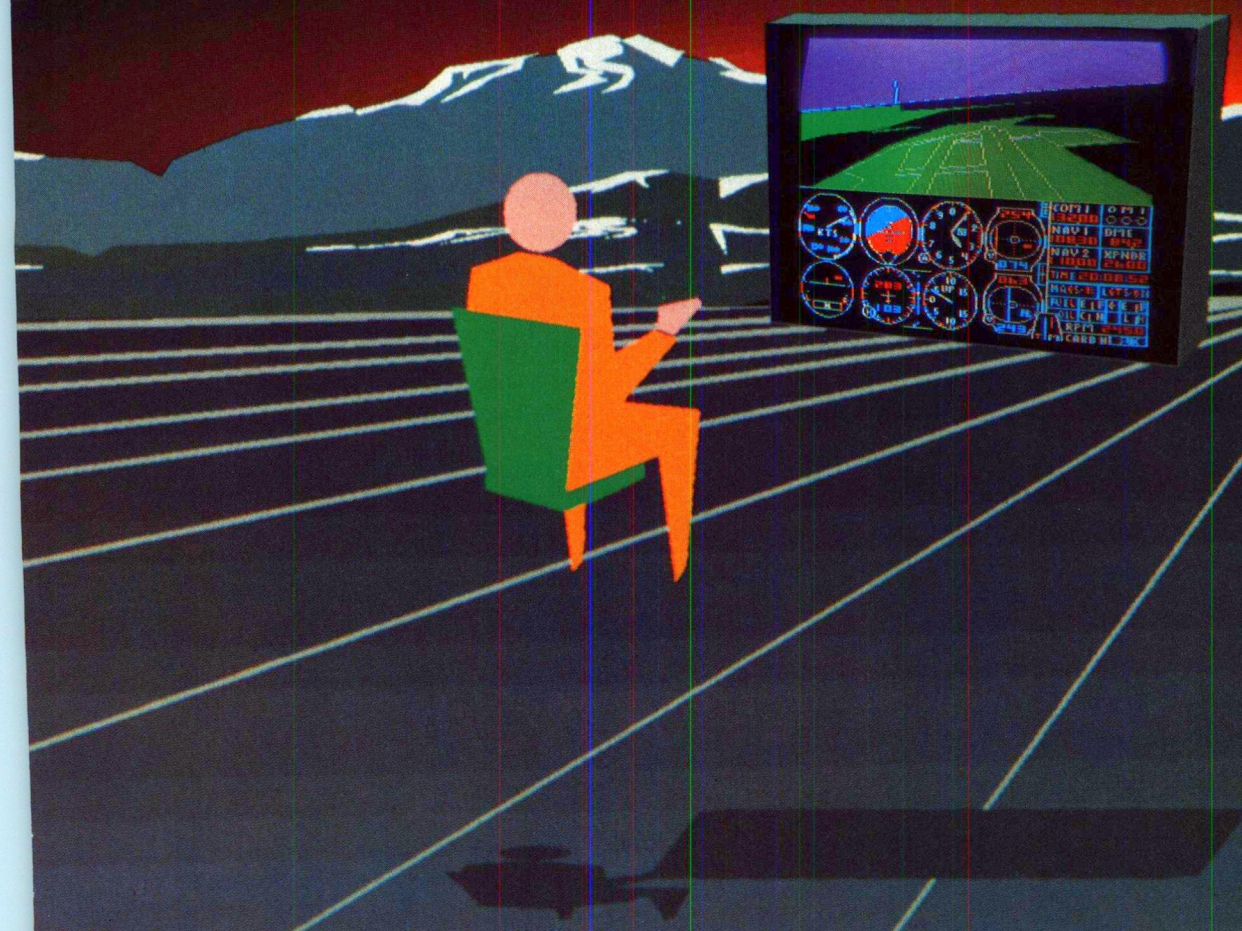

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Editorial Office: 11 Davis Drive, Belmont, CA 94002; (415) 598-2290
Advertising/Business Office: Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016, (212) 503-5105
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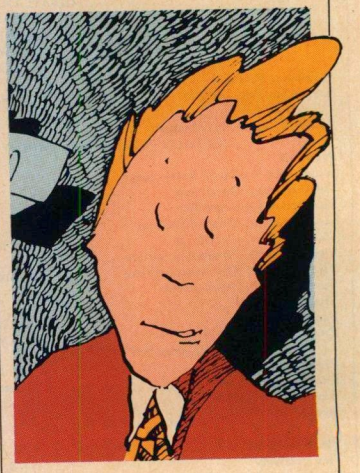

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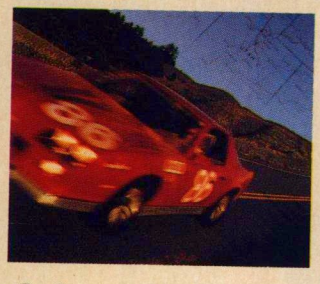

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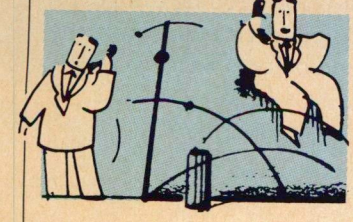

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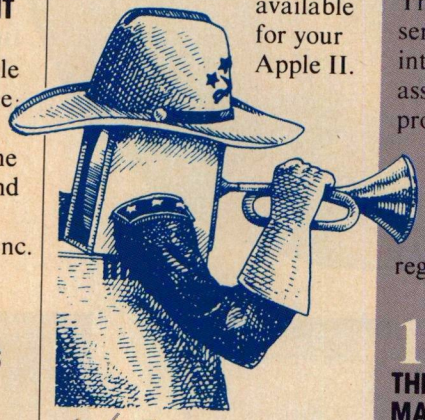

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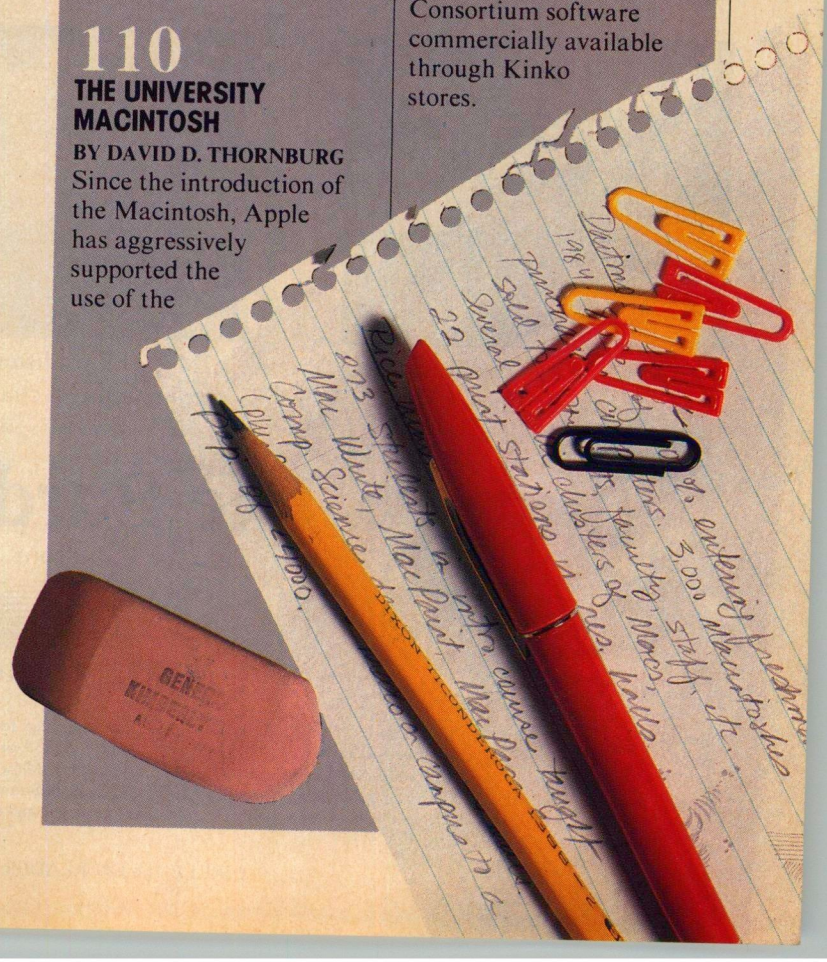

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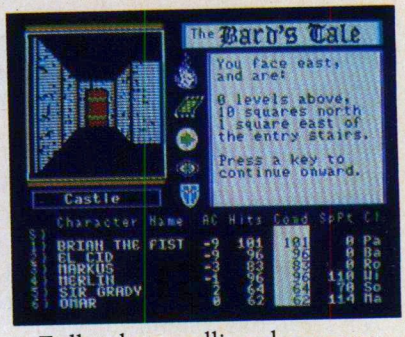

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Message from Maggie

APPLE II CLONES EMERGE

This month we decided to take a look at alternatives to Apple II computers. Until recently, Apple-compatible computers were as scarce as California condors. The two products under scrutiny in our cover story are the Franklin Ace 2000 series and the Laser 128. They are quite different and do not emulate the same Apple computer: The Franklin is an Apple IIe clone, and the Laser 128 is a IIc lookalike.

Compared to the numerous choices of the IBM market, there are not many Apple-compatible computers. Apple clones have traveled a treacherous and dead-end road until now. In fact, the historical details deserve inclusion in the storehouse of computer legends for which this industry is so famous. The first attempts to latch onto the lucrative Apple market were in the early 1980s, when Franklin Computer introduced the first Apple II clone. Apple did not take kindly to this invasion of its turf, so it pointed its legal forces at the fledgling company and filed suit for copyright infringement.

Several years and hundreds of thousands of dollars later, Franklin lost the suit and was eventually forced to file for Chapter 11 bankruptcy protection. The story did not end with Franklin slinking off into the sunset, though. In fact, this tenacious company bounced back after several lean and lonely years with a new clone that passes the copyright tests.

Franklin was the most obvious company trying to claim potential Apple enthusiasts, but several clones from the Far East filtered into the market in the early 80s. These products didn't go far, as Apple successfully pursued any potential threat—until recently that is.

The Laser 128 also has an interesting background. This Apple IIc lookalike is not manufactured in the U.S.; it is assembled in Hong Kong and distributed by Central Point Software and Video Technology Ltd. Central Point is a software company famous for its Copy II Plus, one of the most popular programs around, and is run by the president of Language Arts, Mike Brown. Ironically, Language Arts was originally a contractor for Franklin.

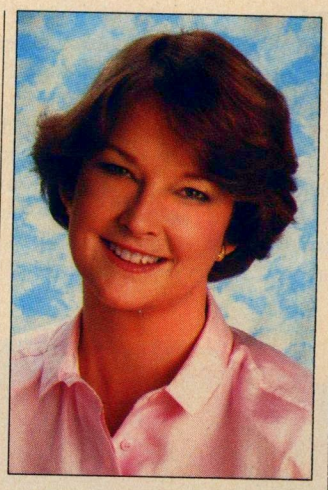
When Franklin declared Chapter 11, Brown and his crew settled with Franklin and went on to a new venture. It turned out to be a joint effort of Video Technology and Language Arts. Video Technology provided the hardware technology, and Language Arts provided the software for the ROMs. The story gets more complicated the further you get into the details, but what's important is that the Laser 128 has passed both the patent and U. S. Customs copyright inspections and that Apple is currently inspecting it for copyright infringement.

The whole issue of the legality of computer clones is not by any means unique to Apple Computer. The IBM clone market is robust and growing, and IBM has definitely tried to stop the tide of clones. Nevertheless, IBM has not been as successful as Apple at fending off imitators. If the two new Apple II clones, the Franklin Ace 2000 and the Laser 128, meet with even a modicum of success, you can bet you will see more alternative compatibles, and they won't be coming from the U.S.

The biggest issue for consumers is, of course, whether to buy an original or an imitation. As with any purchase, the answer is highly individual. If you are considering an alternative to an Apple II, the main questions you should ask are: Does the equipment run the software you need, and can you get service without waiting an unreasonable length of time? +

Maggie Canon

MAGGIE CANON/**EDITOR IN CHIEF**



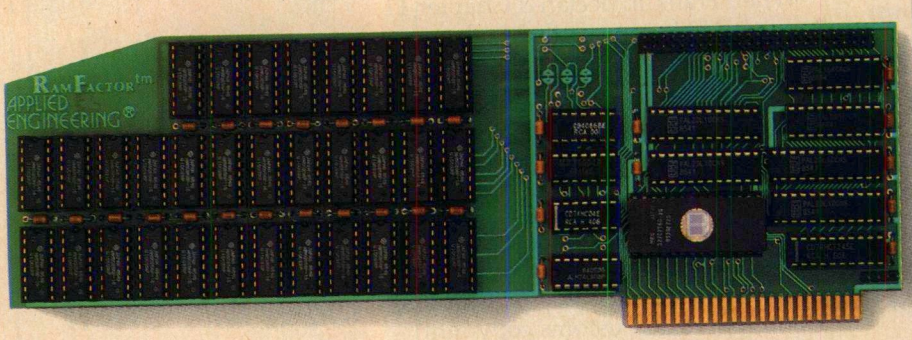
If the two new Apple II clones meet with even a modicum of success, you can bet you will see more alternative compatibles, and they won't be coming from the U.S.

RamFactor™

All the Performance, Speed, and Software Compatibility of RamWorks™ in a Slot 1 through 7 Card.

That's right! Now Applied Engineering offers you a choice. While RamWorks is the clear winner for the auxiliary slot in a IIe, RamFactor is the standard for slots 1 through 7. Now anyone with an Apple II+, Franklin, or Apple IIe preferring to use slots 1 through 7 can now enjoy the speed and performance that until now was only available with RamWorks.

With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 meg on the main board and up to 16 meg with additional piggyback card. And since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets.



Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other memory card (RamWorks excepted) is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available to anyone with an Apple IIe *or* II+ with an 80 column card. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

True 65C816 16 Bit Power

RamFactor has a built-in 65C816 CPU port for direct connection to our IIe 65C816 card for linearly addressing up to 16 meg for the most powerful 16 bit applications. (II+ 65C816 card under development.)

Powerful Program Switcher

With RamFactor, you can organize memory into multiple work areas and switch between them. Each work area can contain different programs and even different operating systems. Now you can switch from one program to another or even switch from AppleWorks to DOS 3.3 to CP/M to Pascal to ProDos in under a second. And with our Battery back-up option, you can have permanent storage for up to 20 years.

Quality and Support of the Industry Leader

RamFactor is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

Features:

- Up to 16 meg total memory, 256K to 1 meg on main board. Up to 16 meg with additional memory on piggyback card.
- Fully Apple II Memory Expansion compatible
- Compatible with Apple IIe, II+ and Franklin
- Battery back-up option allows you to turn on your Apple and run your favorite programs in less than 1 second!
- Automatically recognized by ProDos, DOS 3.3, Pascal and CP/M
- Built-in RamDrive™ software (a true RAM disk not disk caching)
- Systems are directly bootable from RamFactor if desired
- Built-in linear addressing 16 bit co-processor port
- Built-in self diagnostic software
- Automatic expansion with AppleWorks 1.3 or later
- Allows Apple II+ and IIe to run your AppleWorks without buying additional software
- Accelerates AppleWorks
- Displays time and date on the AppleWorks screen with any ProDos clock
- Fits any I/O slot except slot 3
- Fully socketed and user upgradeable
- Much, much more

RamFactor with 256K	**$239**
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RamFactor with 1 MEG	**$389**
RamFactor with 2-16 MEG	**CALL**
Battery Back-up Option	**$179**
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Order RamFactor today . . . with 15 day money back guarantee and our "no hassle" five year warranty. *Call* 9 a.m. to 11 p.m., 7 days, *or send* check or money order to Applied Engineering. MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 if outside U.S.A.

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Letters

We invite your comments.

SPELLWORKS DOES WORK

Dear A+: I was disappointed that you did not deem it necessary to reply to Charles Rubin in his March 1986 letter to the editor regarding Spellworks.

The gentleman apparently hasn't read his directions completely or doesn't understand them. Spellworks does edit as he desires with the proper functions. After using the spell-checking function, you return to AppleWorks and retrieve both files, the one left by Spellworks and the file you had checked in AppleWorks—they are both now on your Save disk. By using your Copy function key in the Spellworks file, you copy the misspelled words to the Clipboard; next, you go into your work file and copy the work from the Clipboard to your file. Then you can use the Replace function, and it finds the words indicated and asks you if you want them replaced or not—a very simple process.

Since Spellworks was designed to be used in conjunction with AppleWorks, they really do complement each other. It is very simple to use and a very good checker if used per instructions.

Mrs. Jeri L. Crawford
Marion, IA

MIDI GENESIS

Dear A+: I enjoyed your editorial in the February 1986 issue on "The Musical Wizardry of MIDI." Interface standards need (and deserve) continuous attention, since they provide the public with important ongoing benefits.

However, I was distressed to read in your second paragraph that the MIDI standard was born of "a joint agreement between musical instrument manufacturers . . . and computer manufacturers." This statement is not accurate. MIDI was born, paid for, and raised in the music industry by five musical-instrument manufacturers: Sequential Circuits, Roland, Yamaha, Korg, and Kawai. Absolutely no computer manufacturers were involved.

Since its introduction in 1982, however, most manufacturers of electronic musical instruments have incorporated MIDI into their new products. Commodore, AT&T, IBM, Apple Computer, Inc., Tandy, and Atari all began showing interest relatively late in the game (1985), well after MIDI was firmly established in our industry.

Steve Salyer
Marketing/Sales Manager
Sequential Circuits
San Jose, CA

Thank you for setting the record straight.—Editors.

SOFTWARE COPYING AS CIVIL DISOBEDIENCE

Dear A+: This letter is in response to David Thornburg's "What's Turning Teachers into Thieves?" in your March 1986 issue. Dr. Thornburg is flying in the face of deep-rooted American tradition dating back to colonial times. Americans have always gone around or ignored repressive, restrictive, or unenforceable laws and regulations. Civil disobedience, to borrow a latter-day buzzword, seems to be the norm rather than the exception in the culture of our country. I won't belabor the point, but look at the underwhelming success of Prohibition and the 55-mph speed limit. (Oh, and don't forget the insidious satellite dish/VCR conspiracy.)

In terms of pure morals and/or ethics, I must admit that Dr. Thornburg is correct. Ripping off a copyrighted piece of software is both immoral and illegal. However, as George Bernard Shaw pointed out through the words of Alfred Doolittle, the poor can't afford morals. Unfortunately, all too many school systems and teachers are literally poor.

I was less than deeply touched by Dr. Thornburg's allusion to the closing down of educational-software houses, just another natural phenomenon of our (more or less) free-market economy. Opportunists got into a potential boom market, then proceeded to price themselves out of it. The majority of today's "slick" educational software is prohibitively priced. Period. The reference to students with one book per course is ill-chosen. A textbook might cost $20 to $25 (as opposed to $39.95 to $49 for a piece of commercial software), but it will last a whole semester or a whole year (as opposed to a grading period or less for the content of a piece of software). The analogy does not stand up economically.

Most of the better educational software is disk-interactive. This means that a single copy of a piece of software, practically speaking, is only useful in a one-on-one tutorial role unless the school system is fortunate enough to have true networking of its computer lab.

Of course, if a school did pay its dues to the capitalist system by buying networking hardware, there would be nothing illegal about several students simultaneously benefiting from the same single piece of commercial software.

Sorry. I'm afraid that as long as teachers are interested in teaching the kids in their charge, regardless of the lousy pay and tight budgets, piracy of educational software will remain alive and well.

John C. Reimer
Teacher
Mt. Juliet, TN

CORRECTION

In our April 1986 issue on page 139, we inadvertently omitted a large portion of the PictureAide program listing. It is too long to reproduce here, but you can obtain a copy on CompuServe in the MAUG area in Data Library 3, under the name Aide.Pit, or on GEnie in the Macintosh Round Table; or we will send you a complete listing if you write to A+ Magazine, PictureAide, 11 Davis Drive, Belmont, CA 94002 and include a self-addressed stamped envelope.

NUMEROLOGY DEFENDED

Dear *A+*: My program Numerology For the New Era was not given a fair review in the "That's Entertainment" section of the February 1986 issue of *A+*. The reviewer openly stated his prejudice against the nature of the product from the very beginning. He used his own numbers in the review but gave numerous erroneous examples to discredit the program's ability to function properly.

It was natural for me to use the reviewer's pen name and the numbers he supplied to understand his intense attempt to discredit my program. The individual with the #2 Major Challenge of sensitivity has the tendency to discredit others when threatened in any way. The combination of this sensitivity, his confirmed skepticism, and the influence of the #7 and #4 for self-protectiveness could have created this desire to "ax" this program.

(1) All numbers in this program reduce to a single digit except for 11/2 and 22/4, which are master numbers with a higher meaning. Therefore, it is impossible to have a "1040" number as stated in col. 2, page 89 of the review. (2) His Soul Desire is described as being a "0" at the bottom of col. 3, page 89. It is mathematically impossible to add numbers together and get a "0." (3) At the bottom of col. 1, page 90, he now says that his Soul Desire is the number of "self-expression" which is #3.

(4) The #3 Screen is for the Pinnacles and not a repeat of Screen #2, which shows the Dates and Challenges as written at the top of col. 1, page 90. (5) His Soul Lessons showed (2) minuses, #3 and #5, and not all (8) minuses as stated in col. 2, page 90. (6) The number on each position does have a brief description, and printed charts do make original gifts.

My analysis of this chart indicates a person who has a keen, analytical mind destined to seek knowledge to share with others. By combining this with his creative talent for writing, he could satisfy the desire of both the #11/2 Ultimate Goal to be an inspiration to others and the #8 Challenge for success and recognition from the middle part of his life on. This is why it is important for him to conquer the sensitivity of the #2 Challenge.

This program can be used as a guide to understand your family members, coworkers, and even the leaders of the world. It has the potential of helping humanity realize the ultimate truth—that each one of us is a unique person with a special set of plans to complete in "this school of life," regardless of race, color or religion. Yes, Pythagoras knew angles, but he also knew "people"!

Betty Gibson
Numbers R-U
Campbell, CA

We stand by our writers, but we also feel it is only fair to allow manufacturers a chance to respond to criticism.—The Editors

*Available for the IBM PC, PCjr, and compatibles; Apple II, II+, IIe; Commodore VIC 20, 64, and 128.

MORE FUN PER BYTE

Turn your home computer into a source of fun for the entire family. The fischertechnik Robotic Computing Kit offers a new and exciting way to learn all about programming, robotics, and computer control.*

The kit teaches and entertains by letting you build and program many different, challenging projects. It's designed so every member of the family can have fun the first time they use it. The novice can start off by building a simple traffic-light project which teaches basic computer input/output operations. The family computer whiz can use advance programming skills to build and control more complex projects, like a teachable robot.

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CIRCLE 319 ON READER SERVICE CARD

MultiRam™ RGB

The //e Memory Card That Outdoes The Rest!

MultiRam™ RGB's standard features include an exclusive 10 year battery backed RAM port, up to 1 Megabyte of RAM expandable to 4 Megs, RGB Video, and *More*

The MultiRam™ RGB Card offers more standard features than any other //e auxiliary RAM card, features simply not available with other RAM cards or available only as expensive options.

The Hardware

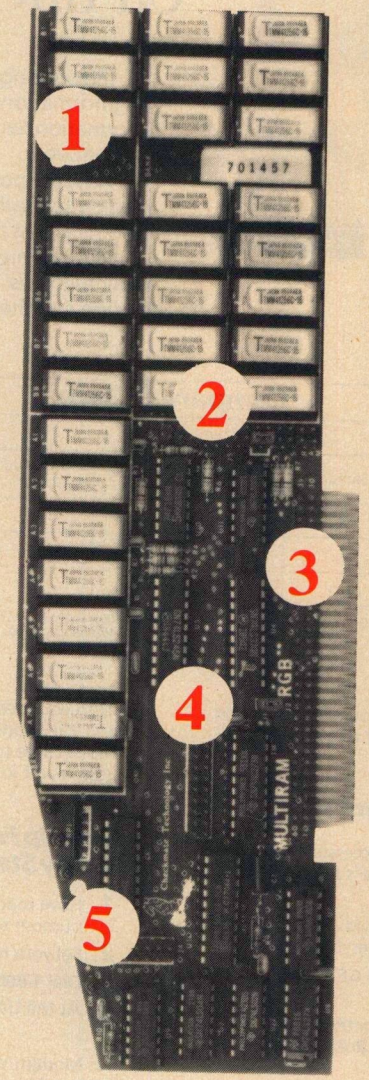
1. With ***1 Megabyte capacity,*** MultiRam™ RGB is available in sizes from 64K to 1 Meg. Plug in your own 256K or 64K dynamic RAM when you need more memory. Then use our sophisticated, unique hi-res RAM test to show the exact location of any bad RAM on the card while testing. Apple Computer says it's the best RAM test available for any memory card.

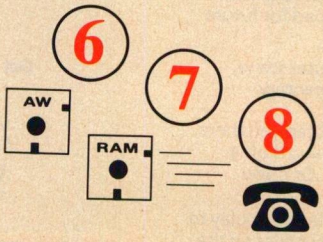
2. The ***SRAM Port*** can be connected to an optional SRAM Pack containing 128K to 2 Megs of Static RAM with 10 year battery backup. Shut off the Apple and all programs and data in SRAM will be there when you turn on the Apple tomorrow. Or next week. Or next year. The SRAM option makes MultiRam™ RGB the only //e memory card that remembers what was stored in it when you turn off the Apple. SRAM Pack options will be available later this year. MultiRam™ RGB is the *first and only* Apple RAM card to offer the SRAM port.

3. Expand MultiRam™ RGB up to 4 Megs using the ***memory expansion pins*** on the card's back. Add a ¾ Meg MultiRam™ //e card for a 1¾ Meg total. Or add a 3 Meg MultiRam™ Plus card for a 4 Meg total, the most memory available in one slot for the Apple. Because either expansion card fits on the RGB's back (the power supply side), they never touch or interfere with cards in slot 1, another exclusive MultiRam™ feature.

4. The ***65C816 CPU Port*** allows the MultiRam™ EX 65C816 card, a 16-bit option, to directly address all memory on the MultiRam™ cards without bank-switching. Advanced 16-bit software, like VIP Professional, a Lotus 1-2-3 compatible spreadsheet, can use this memory for power spreadsheets. Another MultiRam™ exclusive.

5. The ***RGB Video*** connector links the card to any Apple compatible RGB monitor for crisp, vivid 80-column and double hi-res displays. RGB video is standard with the card, an option others charge hundreds for. Of course MultiRam™ RGB also provides you with regular 80-column and double hi-res graphics because it's a direct replacement for the Apple extended 80-column card.





The Software

6. ***AppleWorks expansion software*** is included with MultiRam™ RGB to expand AppleWorks from 55K to 3,034K, the largest Desktop available. AppleWorks expansion software lets you • automatically segment and save large files to floppy • load all or parts of AppleWorks into RAM (even printer routines) for supercharged speed • easily use a RAM disk along with an expanded Desktop to store Pinpoint and Jeeves accessories for immediate response • create databases of more than 23,000 records vs the ordinary 1,350 records • create word processor files over 5,000 lines (more than 100 pages) • and show date and time on screen with any ProDOS clock and enter them into databases with one keystroke. And we're adding new features all the time.

7. ***RAM Disk software*** for ProDOS and DOS 3.3 is included with the card. Programs are also included to partition and customize the RAM disks as well as to quickly copy files to and from the immense, lightning fast RAM disk (20 or more times faster than floppies) that can be created from MultiRam™'s memory. Pascal and CP/M RAM disk software is available at nominal cost.

The Service

8. We don't forget you after you buy. ***Customer Support*** is as important a MultiRam™ feature as any other. Get ***free*** software upgrades from your dealer as we improve our software. Call us on our Customer Support line if you have a question, to see what new programs support more memory, or to tell us your suggestion for improving our hardware or software. We listen to you. We respond. MultiRam™ RGB is just one example of what we do when we listen!

Ask your dealer for MultiRam™

From $199.95 with 64K RGB cable extra

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CIRCLE 128 ON READER SERVICE CARD

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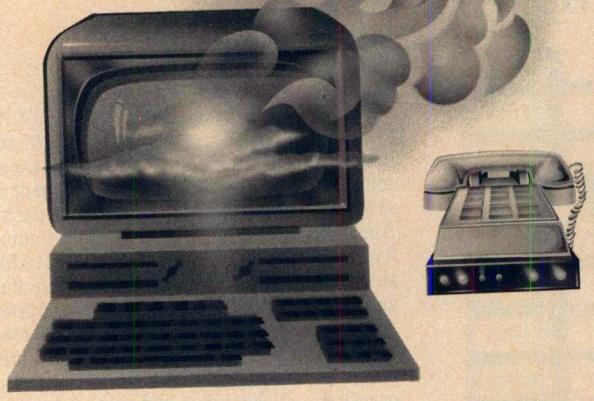

Introducing GEnie, the General Electric Network for Information Exchange. It's part of General Electric Information Services—the largest commercial teleprocessing network.

Now the power of GEnie stands ready to bring a little magic into the life of PC owners just like you. And for potentially much less than other on-line information services.

With GEnie, you pay no hidden charges or monthly minimum fees. You pay only for the actual time you're on-line and the $18.00 registration fee. Nothing more.

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	SIGs/User Groups	Electronic Mail	CB Simulator	Computing News	Games	2400 baud access	Registration fee	Monthly minimum	Non-prime time rates 300 baud	Non-prime time rates 1200 baud
GEnie*	**X**	**X**	**X**	**X**	**X**	**X**	**$18.00**	**none**	**$5.00**	**$5.00**
CompuServe	X	X	X	X	X	X	$39.95	none	$6.25	$12.75
The Source	X	X	no	X	X	X	$49.95	$10.00	$8.40	$10.80

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Save up to 60%

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A TEACHER'S VIEW OF SOFTWARE COPYING

Dear *A+*: I read with interest your article in the March issue of *A+* entitled "What's Turning Teachers into Thieves?" in David D. Thornburg's "The Learning Curve" column. Dr. Thornburg made some interesting points, but, as a teacher, I would like to make some comments in return.

Thornburg stated, "The renunciation of illicit disk copying may be too much to ask of the public at large, but I am ashamed to think that it may be too much to ask of teachers." Why are teachers expected to be the "pillars of society?" We are certainly not given the respect or the salary we deserve if we are to shoulder this extra burden. Teachers are no different from other everyday people—people just like Dr. Thornburg. Copying disks may be wrong, but I find it hard to accept that it is "more wrong" for teachers than it is for other people.

A second point I would like to make is one that Dr. Thornburg managed to completely overlook. When buying software for my school or for myself, I usually make my purchases from a local dealer. In my experiences as a computer user (5+ years), I have never met a dealer who cheerfully allowed me to test software prior to purchasing it. Their excuses vary—"We can't sell it after it's opened," "You can't take it home—you'll just copy it," etc.—but the results are the same: If you want to try it, buy it! A teacher (or a school, for that matter) on a tight budget cannot afford to make the mistake of buying an expensive piece of software that ends up not doing what it claimed to do. Only by prior testing of software can this situation be eliminated. Maybe Dr. Thornburg should consider writing an "open letter" to all dealers in a future column.

Third, Dr. Thornburg's comment about "sharing dittos" shows his lack of knowledge concerning schools. We teach geometry with a textbook from the Houghton Mifflin company; we also use a resource book (of ditto masters) that provides worksheets and tests for our books. We did not buy one resource book for each geometry teacher, however—we all use the same one. I have never heard Houghton Mifflin (and believe me, I get plenty of correspondence from them about new products) complain about going out of business because of teachers sharing their resource books. Houghton Mifflin has the same market as an educational-software publisher, so Thornburg's argument doesn't hold any water.

Finally, I applaud Thornburg's statement that "the solution is more money for schools." With Mr. Reagan and many state governors leading the campaign to reduce federal and state spending, however, that probably will not be a viable solution in the near future. Maybe federal and state funding of schools could be another topic for Thornburg to discuss in a future "Learning Curve" column.

Thornburg did make some valid points. In my case, though, if I have received a copy of a program that I feel is useful, I then buy the program—for example, I own originals of all the Print Shop disks. The next time Thornburg writes a column of this nature, he might take time to research his topic a little better, perhaps by talking to some teachers.

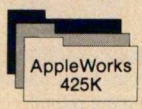
Joe Ankenbauer
Lewis Central High School
Council Bluffs, IA

MultiRam™ CX

Adds 256K or 512K to your Apple IIc for under $260!

The **MultiRam™ CX** memory card fits inside the IIc, just under the keyboard. Installation and testing require only a screwdriver and few minutes time. Using the big memory of the **MultiRam™ CX** is just as easy as installing it.

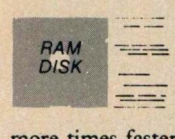
Expand your AppleWorks Desktop and file sizes to a possible 425K. But MultiRam's™ AppleWorks expansion software (included with every card) does more for AppleWorks than just add more memory. It also:



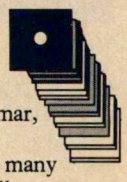
- Automatically saves and loads files larger than one floppy disk to multiple disks
- Loads all or parts of AppleWorks into RAM (even printer routines) for supercharged speed
- Uses a large RAM disk along with an expanded AppleWorks
- Creates 23,000+ record databases versus the standard 1,350 records
- Creates 5,000+ word processor line files (more than 100 pages) versus the 2,250 line standard
- Shows the date and time on screen with most IIc clock cards
- Enters the date and time into database fields with 1 keystroke

And we're adding more features to AppleWorks all the time.

Create a huge, fast RAM disk from the large memory of the **MultiRam™ CX.** RAM Disk software for ProDOS and DOS 3.3 is included with the card as well as programs to customize RAM and copy files to and from the immense, lightning fast RAM disk (20 or more times faster than floppies). Pascal RAM disk software is also available.



Run an ever-growing number of programs with MultiRam's™ expanded memory. Supercalc3a, Locksmith, Catalyst, MouseDesk, Sensible Speller, Pinpoint, Jeeves, CopyII+, MegaWorks, Word Perfect, Sensible Grammar, BusinessWorks, MouseWrite, MouseCalc, MacroWorks and many more programs now use or will soon use the added memory of the **MultiRam™ CX.**



Also, you can easily add the 65C816 option to your **MultiRam™ CX** to run new, powerful 16-bit software like VIP Professional, a Lotus 1-2-3 workalike.

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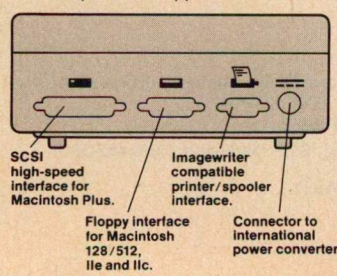

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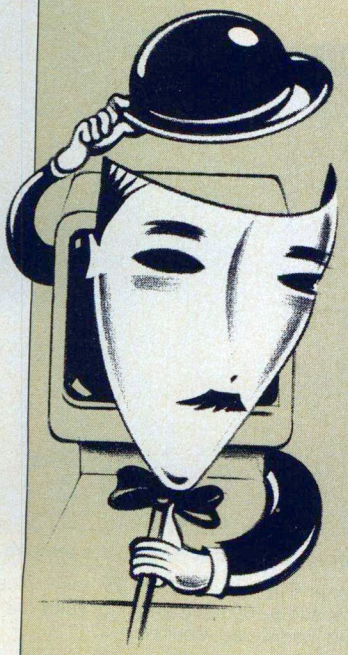
CIRCLE 175 ON READER SERVICE CARD

BY FREDERIC E. DAVIS

NewsPlus

If anyone can bring MS-DOS and PC compatibility to the Apple II, it is The Engineering Department.



APPLE II/IBM COMPATIBLE?

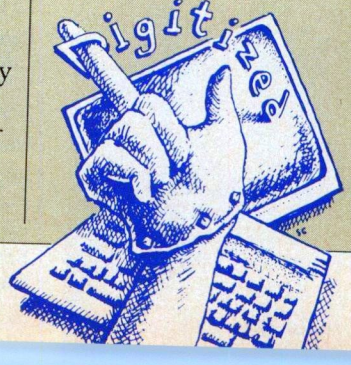
A small R&D company called The Engineering Department is rumored to be working on a group of products that will let you turn an Apple II Plus or IIe into an inexpensive IBM PC compatible. The products are centered on a coprocessor with an 8086 CPU that should be faster than the IBM PC, a PC-style disk-drive controller, and a graphics controller compatible with the standard IBM PC color-graphics adapter board.

Although several companies have attempted to bring IBM PC compatibility to the Apple II line, none have been successful; some of you may remember Rana Systems, which went broke trying to do it. The Engineering Department may be different, however. The company has five of the original Apple II designers. They have many major software and hardware products under their belts, and if anyone can do a good job of bringing MS-DOS and PC compatibility to the Apple II, it is these guys. The products, code-named Little Blue, look like they will have a low enough price to be competitive with comparable IBM PC compatibles.

According to company officials, the Engineering Department will not market any products itself; instead, it is seeking a large, well-established computer-hardware company to market Little Blue under its own label. We'll keep you informed about this development and discuss some of its implications for the Apple market in upcoming issues of *A+*.

GET A HANDLE ON IT

A new programming language code-named Grasp may be the ultimate in object-oriented languages. Grasp is a visual programming language that you operate by placing a special glove on your hand and manipulating images on the screen as if they were real objects. The language features methods for real-time interaction with text, data, graphics, animation, and sound. The glove is a special input device that supposedly looks and feels like an ordinary glove.



Grasp is being developed for the Apple II series of computers by VPL Research of Palo Alto, California, and will be marketed by Share Data of Eden Prairie, Minnesota. We'll keep you posted as soon as we get some "hands on" experience with this product.

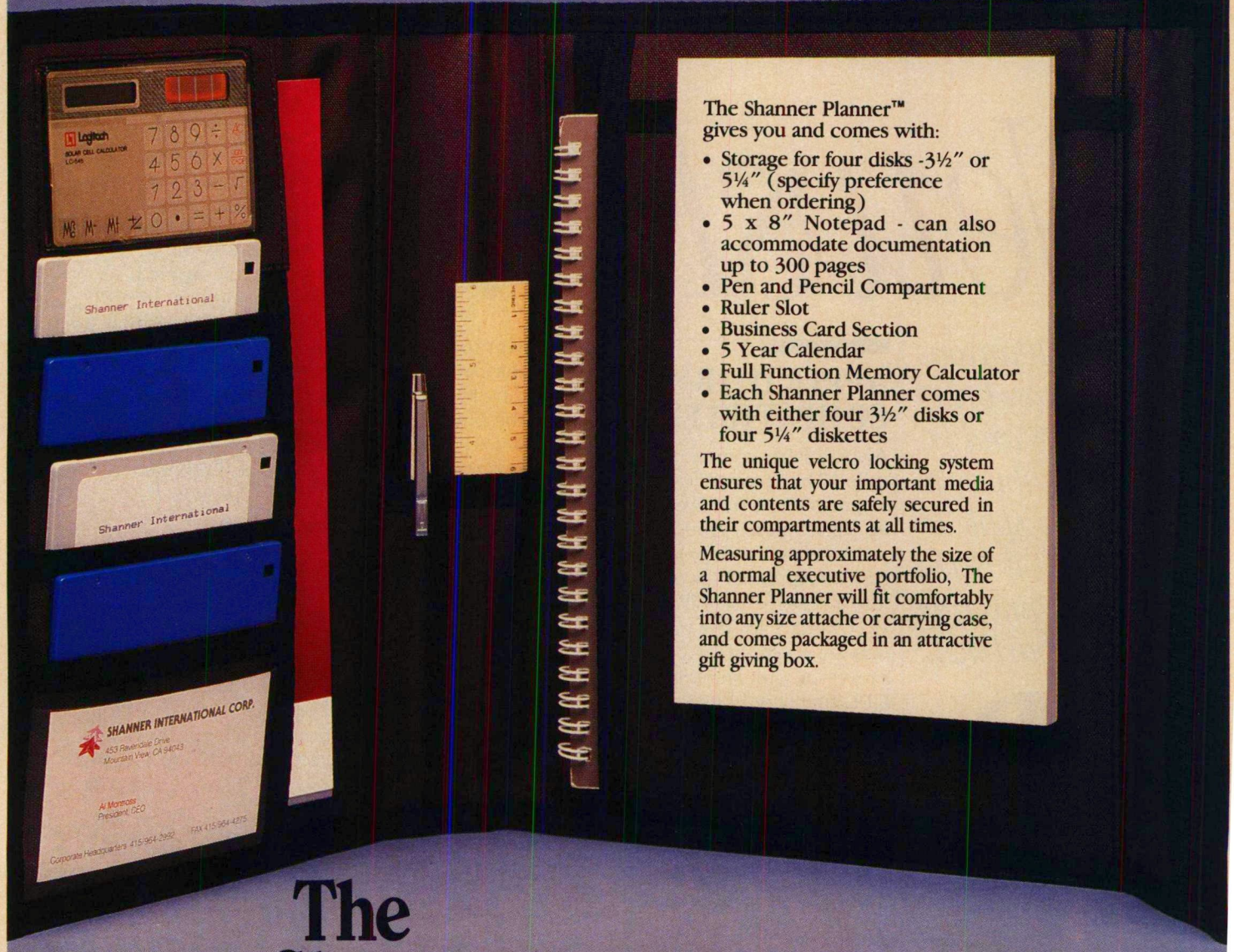
POETRY FROM PLANTS

I've always said that Apple owners come up with the most creative and offbeat uses for their computers, and a letter I recently received from Joe Sanchez of Long Beach, California,

serves as an excellent example of that point. Sanchez is an aerospace engineer and former nuclear-weapons specialist who talks to his plants. The difference is that for the past two years, his plants have been talking back. In fact, with the assistance of an Apple, the plants even write poetry.

Sanchez read the book *The Secret Life of Plants* and was intrigued by the research that indicated

It speaks for itself.



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NewsPlus

Apple owners come up with the most creative uses for their computers.

that plants gave off electrical charges in response to environmental stimuli. To further explore this phenomenon, Sanchez constructed a device that combined an Apple II system, a voice synthesizer, sensitive electrodes for attaching to plants, and a 30K program he wrote to convert impulses from the plants into words.

Although Sanchez admits that plants can't think or theorize, he maintains that plants can react to humans. Sanchez believes that valuable practical applications may result from his experiments; currently, Sanchez is pursuing the possibility that plants can serve as a sort of watchdog to detect the presence of people, an application he feels may be useful in creating security and alarm systems.

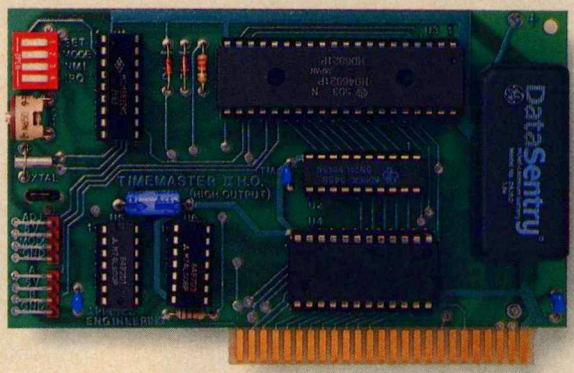
INFORMATION VCR

This spring Microsoft hosted the First International CD ROM Conference and managed to attract more than 1000 attendees. Although the conference proceedings could have been repackaged as a sleep aid, talk in the hallways was spirited, and there was a lot of excitement about how CD ROMs will affect the computer industry. CD ROMs are the same compact discs (CDs) that are sold in record stores with music on them. The difference is that CD ROMs store data rather than music, and the amount of data that can fit on a CD ROM is amazing: more than 500 megabytes! According to one conference attendee, 500 megabytes is an entire bookshelf, six feet wide, filled from floor to ceiling with books.

One of the best things about this emerging technology is that the music industry has created a large enough demand for CD audio products that CDs and CD players are being inexpensively mass-produced. As a result, CD ROM computer peripherals will be available much sooner, and at about a tenth of the cost, than if they had been developed solely as a computer peripheral. Bill Gates, chairman of Microsoft, predicts that low-cost CD ROM players will be developed for displaying information. These CD ROM players will be akin to an electronic book; in fact, I expect to see a Sony "Bookman" on the market within the next year or two.

At the Microsoft conference, Sony and Phillips introduced a new standard for CD ROMs called CDI, which stands for compact disk—interactive, also referred to as the "green-book standard." CDI combines CD ROM technology with the 68000

Timemaster H.O.™, the only clock that displays time and date on AppleWorks'™ screens and files.



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NewsPlus

There is a lot of excitement about how CD ROMs will affect the industry.

processor and the OS-9 operating system, the operating system of the TRS-80 Color Computer. CDI allows the combination of text, graphics, sound, and animation into multimedia audiovisual presentations. Developers who want to start prototyping CDI applications with OS-9 can purchase an Apple II 68000 coprocessor board that includes OS-9 and a CD ROM controller from MicroTrends, 650 Woodfield Drive, Suite 730, Schaumburg, IL 60195; (312) 310-8928.

DESKTOP CHIPMAKING

A new technology known as laser pantography holds the promise of enabling you to create new IC chips at your desktop. Although inexpensive commercial devices are still many years away, scientists are predicting that special laser devices akin to laser printers could print actual circuits onto silicon wafers and create new chips in a device that could fit on a desktop.

In prototype laser-pantography devices now being developed, a silicon wafer is placed in a chamber that can be filled with a variety of organometallic gases. These gases contain metals such as nickel, aluminum, or gold. The laser then heats the surface of the wafer, which fuses metals from the organometallic gas onto the wafer's surface in the patterns the laser prescribes. Laser pantography is not only useful for creating prototype and test designs of chips, but it can also facilitate the production of reasonably priced custom IC chips in very small quantities for specific tasks.

LOGOWRITER

LogoWriter is a new educational-software program that combines a word-processing program with the Logo computer language. LogoWriter lets kids write, draw, create music and animation, and also learn programming skills. With LogoWriter, you can create multimedia presentations that incorporate animation and sound with text. LogoWriter is marketed by Logo Computer Systems, Inc. (LCSI), using a site-licensing program that LCSI hopes will make the software affordable for schools and not prone to illegal copying. Under the LCSI site-license program, a school pays $395 for the right to make unlimited copies of the program for use at that site; for an additional $150, the school can buy the additional right to let the entire student body make copies for use at home. For more information, call LCSI at (212) 765-4780.

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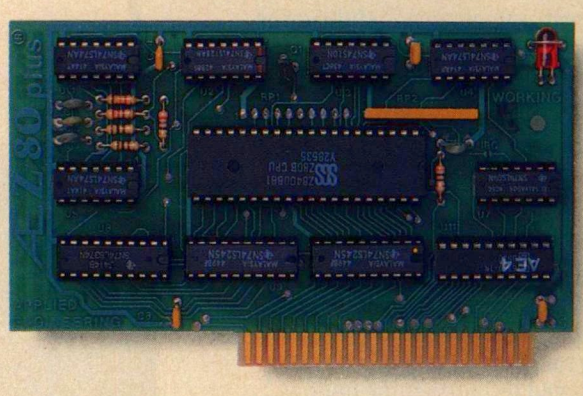

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The new 4.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs — all the way down to Version 1.6 (2.2 is the most popular).

The Z-80 Plus is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80-column card, all 128K is usable, and if you have RamWorks, up to 1088K is available.

Each Z-80 Plus comes with our CP/M Ram Drive software, enabling IIe owners to use an extended 80-column card or a RamWorks card as a high-speed Ram disk which runs CP/M software up to *twenty times faster.* So packages like WordStar and dBASE II run at blinding speed.

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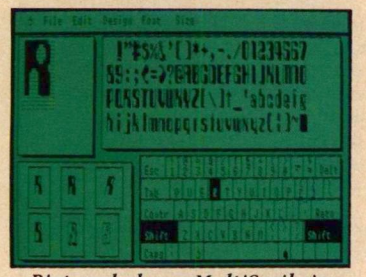

Pictured above: MultiScribe's font editor.

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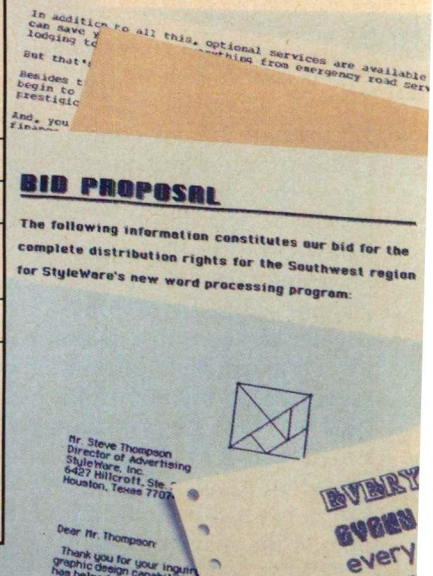

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CIRCLE 155 ON READER SERVICE CARD

NewsPlus

This year may see a major shakeout in computer retailing.

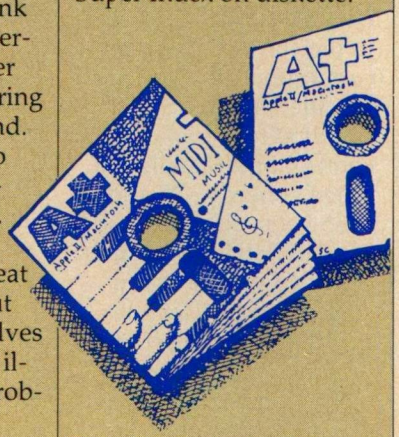
APPLE BAILOUT

Apple Computer has stunned retailers by spending a reported $11 million to purchase bank obligations of ComputerCraft, a major computer retailer known for offering the lowest prices around. Apple's move is said to have saved ComputerCraft from bankruptcy. Companies that don't make any profit are great for bargain hunters, but they may force themselves out of business, which illustrates some of the problems inherent in price cutting. Consumers should be willing to pay a little more in order to keep computer stores in business but are seldom willing to do so.

Although Apple says the ComputerCraft case was a special one, the bailout sets a bad precedent, since other struggling retailers that Apple decides not to rescue may feel slighted and try to sue. The bailout also indicates that the computer retail market is in serious trouble, and this year may see a major shakeout in computer retailing. As a result, I predict that you may start seeing certain Apple products such as the Apple IIc sold in mass-merchandising stores, such as Sears, that don't offer any support.

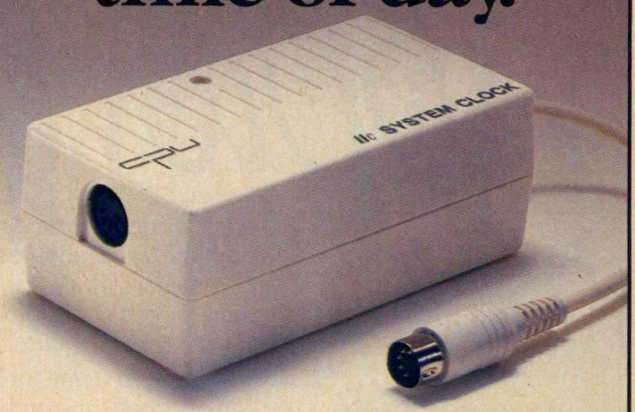
A+ INDEX

Fastfind Company of Palos Verdes, California, has put a comprehensive index of *A+* called A+ Super Index on diskette.



The index summarizes all the articles and other information in all the issues of *A+* from the time we published our first issue in 1983 until now. The A+ Super Index is available in two ways: as a text file for the Apple II series, III, or Mac—or as a database for the Apple II or III that includes the Fastfind database program. The text-file version costs $9 for the Apple II or III or $11 for the Mac, and the database version for the Apple II or III costs only $12. We use the index here in the office and recommend it for all avid *A+* readers. Contact Fastfind at 28503 Coveridge Drive, Palos Verdes, CA 90274; (213) 590-4417 (voice) or (213) 377-0804 (modem—300/1200 bps). +

Your Apple IIc deserves the time of day.



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- Easy to use from BASIC
- Date includes year, month, date and day of week
- Time includes hours, minutes, seconds
- Time and date stamps AppleWorks files
- Auto-access from AppleWorks database
- No-hassle five year warranty

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A Glossary of Terms

BY STEVE ROSENTHAL

AppleWords

Cable esoterica for use with 'You Can Make the Right Connections,' on page 52.

CENTRONICS CABLE
A 25-wire cable for connecting a computer to a printer with a Centronics-style wedge-shaped connector. You'll need one of these if you want to connect an Apple II or Mac to certain brands of printers that use these connectors.

COAX, COAXIAL CABLE
A kind of electrical signal cable that carries one or more center conductors within an outer conductor. The only place you're likely to see one in the Apple world right now is in micro-to-mainframe links.

COVER
A protective fitting that goes over a connector to protect the places where the wires meet the connector pins. Shrouds and hoods are two common varieties of covers.

CRIMP
A style of connector in which you attach a connector to a wire by squeezing the back of the pin around the wire. A special crimp tool is preferable for making this sort of a connection, but a good pair of needle-nose pliers usually does an adequate job.

DB-9
The common name for the type of connector used on the Apple IIc and Macintosh for making serial connections to modems, other computers, and some types of printers and networks. Although actually slightly misnamed (it should be DE-9, as DB refers to the larger-size connector used for 25-pin serial connectors) it does have a D-shaped shell or trapezoidal shell containing 9 pins or sockets divided between two rows.

DCE
The abbreviation for data-circuit terminating equipment, the name used by the RS-232 standard for modems and other devices that connect terminals or computers to communication lines. A DCE expects to be connected to a DTE (data terminal equipment) device.

DIN CONNECTOR
A round connector used on the Apple IIc, as well as on many tape recorders and home video cameras. It is a common European-style connector, made according to German industry (DIN) standards.

DTE
An abbreviation for *data terminal equipment*, the term used as part of the RS-232 standard for serial connections to refer to terminals, computers, and other equipment that might connect to a modem.

EIA VOLTAGE LEVELS
In the context of computer connections, the voltages specified in the RS-232 standard for serial connections. Signals can range between −25 and +25 volts, although −12 and +12 are now the most common values. If you connect an EIA-level device (such as a serial printer or modem) to a device that expects a smaller maximum voltage (such as a Macintosh Plus SCSI interface or disk drive), you may fry some of the chips.

FEMALE
Referring to connectors, ones that have a receptacle or socket rather than a protruding pin.

GENDER CHANGER
A connector or cable that has two male and two female connectors wired pin to pin, which, in effect, changes a male connector to which it is connected to female or a female connector to male.

HERMAPHRODITIC
Referring to connectors, ones in which each piece has protruding and receptacle parts, rather than one configured as male and one as female. Hermaphroditic connectors have yet to appear on Apple products.

HOOD
For DB-9 and DB-25 connectors, a plastic or rubber shield that covers the back of the connector where the wires attach to the pins. Hoods are usually sold separately, since you don't use them if the connectors are mounted inside some piece of equipment.

IMAGEWRITER CABLE
A cable wired to connect the Macintosh to an ImageWriter, with a DB-9 connector on one end and a DB-25 connector on the other. Because, unlike many other printers, the ImageWriter is wired as a computer and not as a modem (DTE rather than DCE), you can also use this cable to connect a Mac to another computer.

MALE
Referring to connectors, ones that have pins or protruding parts rather than sockets or receptacles.

NULL MODEM
A small connection box for hooking up two computers, each of which expects to be linked up through a modem. In addition to crossing the main data wires so that one computer's output is the other's input, it also connects the proper hardware-control lines to simulate the signals that a modem would provide when a complete connection had been made.

PARALLEL CABLE
A cable meant for connecting to a parallel

(byte-at-a-time) interface, such as that of some printers for the Apple II line. Generally, it requires at least eight data lines, one or two grounds, and several status lines.

POLARIZED
Said of connectors that can be plugged in only at the right orientation. DB-9 and DB-25 connectors are polarized by the shape of the shell; on DIN-style connectors, a notch takes care of it.

RIBBON CABLE
A type of flat cable made of individual insulated wires joined side by side. It is inexpensive to manufacture, easy to put connectors on with automated equipment, and physically flexible. Many connections inside Macs and Apple IIs use ribbon cable, but because it is difficult to shield and regulations against radio interference have become more stringent, it is less common for connections between devices.

RS-232C
The standard for serial interfaces (*serial* refers to the eight bits of each character successively sent down one wire) used by most computers, modems, and printers. Minor variations in the way various devices use it often make the successful connection of equipment a matter of some research and experimentation. Most Apple devices use RS-232C or a compatible version of the related RS-422 standard for their serial connections.

SERIAL CABLE
One common term for a cable for connecting devices with serial ports (where each byte is sent, bit by bit, down a single wire). Various Apple computers require different serial cables because they use different-style connectors.

SHIELD
A foil or braided wire covering for a cable that prevents excessive noise pickup or radiation.

SOLDER-TAIL OR CUP
A style of connector that has fine receptacles in the rear of each contact into which you insert and solder a wire.

STRAIN RELIEF
A clamp, bar, or other means of holding a wire or cable that keeps any applied pull from reaching the connection between wire and connector. Molded cables usually have strain relief built in, but it does not come with custom cables.

TTL VOLTAGE LEVELS
Signals that are carried as voltages between 0 and +5 volts (the levels needed for a type of integrated-circuit technology known as transistor-transistor logic). Many TTL devices may become damaged if accidentally connected to voltages outside that range, so be sure not to connect SCSI devices and parallel ports (both have TTL levels) with serial connections (higher voltage EIA-level interfaces), although Apples use similar connectors for both levels. +

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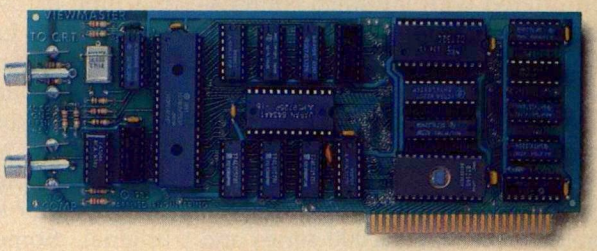

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How do the Franklin Ace 2000 series and the

Author Charles Rubin compares

Successful products have historically bred imitations in the computer world. With the Apple II, however, the road to compatible machines has been littered with lawsuits, confiscations, and other measures Apple has initiated in an effort to remain the sole source of its technology. Now, nine years after the Apple II came out, two Apple-compatible computers promise to withstand Apple's zeal for copyright litigation: the IIe-compatible Franklin Ace 2000 series and the IIc-like Laser 128.

The philosophy behind marketing a compatible is to bask in the glow of another manufacturer's reputation and siphon off some market share by going the original maker one better, either by setting a lower price for the machine or by adding features. The Franklin and Laser machines take significantly different approaches when it comes to offering more.

The Franklin Ace 2000 series primarily offers a more complete package than Apple's for less money than you'd pay for a comparably equipped original. Some of the extras—disk drives, a fan, and a parallel printer port—are features you would probably end up buying for an Apple IIe anyway; others—a larger power supply and extra keys on a detached keyboard—aren't quite as compelling. The Laser 128, on the other hand, is a nearly exact clone of the Apple IIc that offers a couple of important extras and sells for less than half the price of a comparably equipped Apple.

Whichever philosophy guided the design of these two compatible machines, however, the fundamental issue is compatibility itself: Given the roadblocks Apple has put up for would-be vendors of Apple II clones, do these two machines do the job? Are they really compatible, and, if so,

BECKER BISHOP PHOTOGRAPHY

Laser 128 stack up against the real thing? compatibility, price, and performance.

do they represent an equal or superior value when compared with Apple's own products?

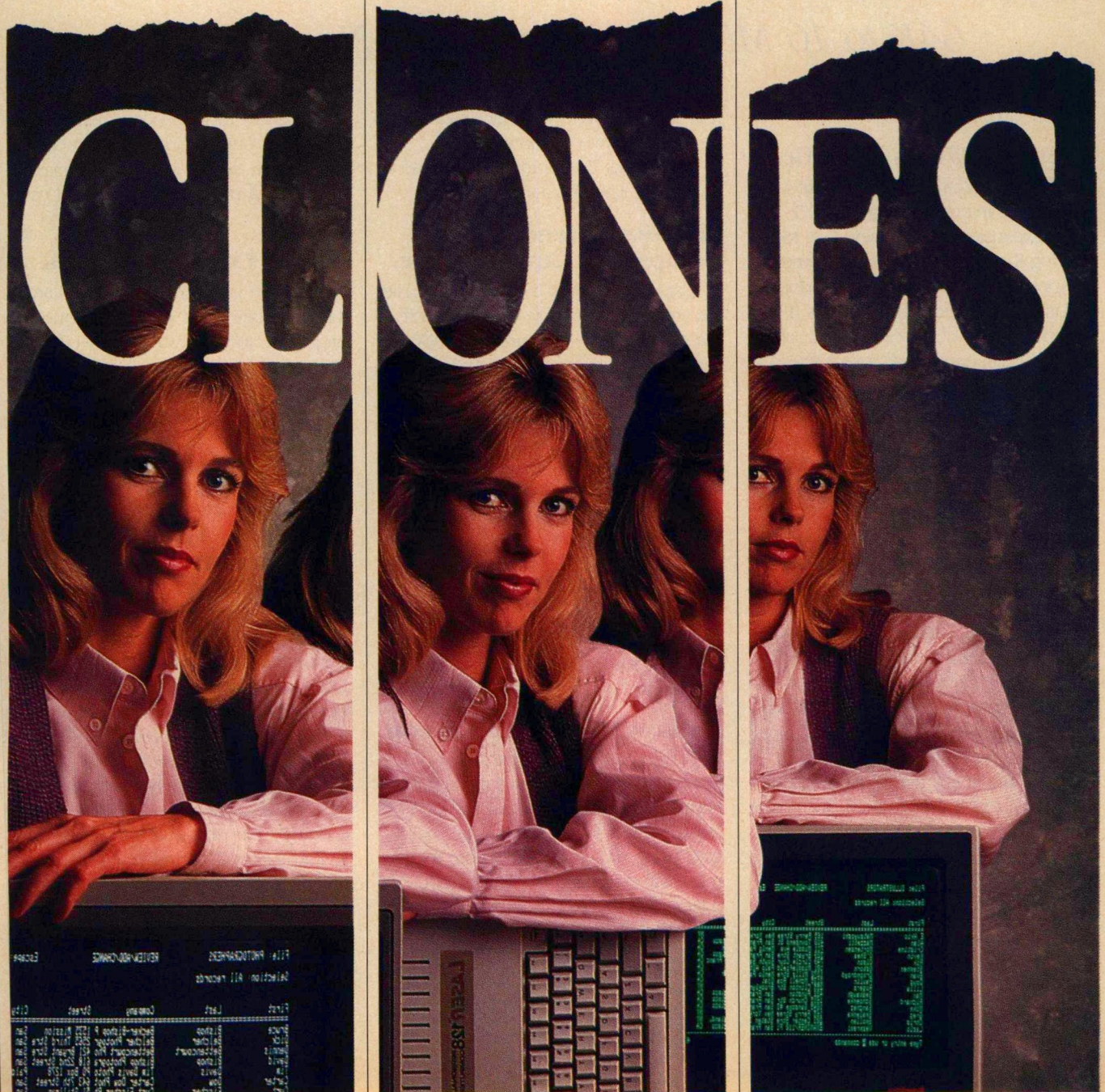
FRANKLIN ACE 2000 FEATURES

Franklin Computer Corporation of Pennsauken, New Jersey, marketed a line of Apple II compatibles for three years until it lost a 1984 court decision on a copyright-violation lawsuit that Apple Computer brought. The lawsuit centered on Franklin's use of parts of the Applesoft ROM and ProDOS, and it ultimately forced Franklin to file for Chapter 11 bankruptcy protection.

Franklin emerged from the bankruptcy proceedings in February 1985, and in September (after having agreed to let Apple examine any new machine it brought out), the company introduced its new Ace 2000 series. The Ace 2000 is a 128K desktop machine with a detachable keyboard and a monochrome monitor, the model 2100 is the same machine with one floppy-disk drive, and the model 2200 is the same machine with two floppy-disk drives.

The new Franklin uses an entirely new ROM and BASIC created by Language Arts of Portland, Oregon, and its hardware design is significantly different from that of the Apple II. According to Franklin president Michael Strange, "Our goal was to integrate as much hardware as possible into the machine and to provide internally the classic expansion that Apple people are used to. We wanted to integrate into the basic machine 95% of the features that most people would end up buying anyway. We tried to create an upscale machine at a downscale price, so you could get more for your money than from an equivalent Apple."

The result is a design that resembles the classic IBM PC configuration:



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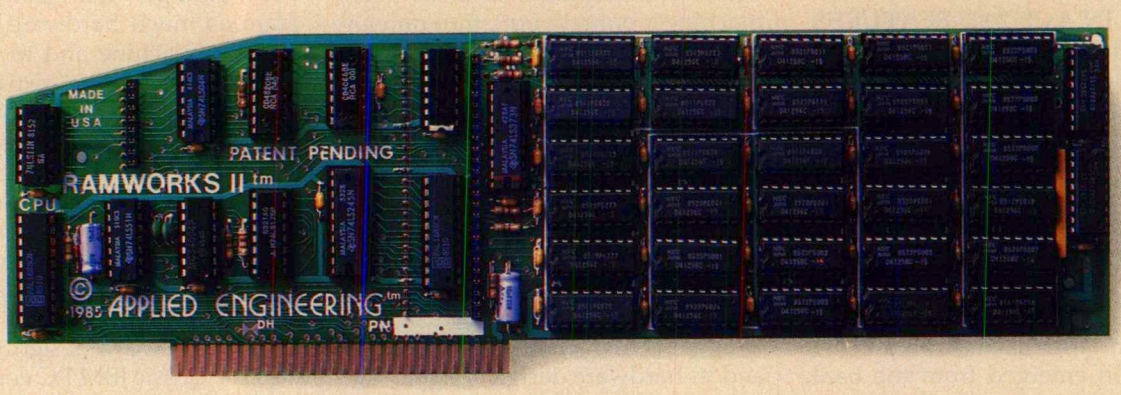

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It's simple, RamWorks II sells the most because it does the most.

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While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K in AppleWorks and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Just look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, all of AppleWorks will automatically load itself into RAM dramatically increasing speed by eliminating all the time required to access the program disk drive. Now switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

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RamWorks II, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

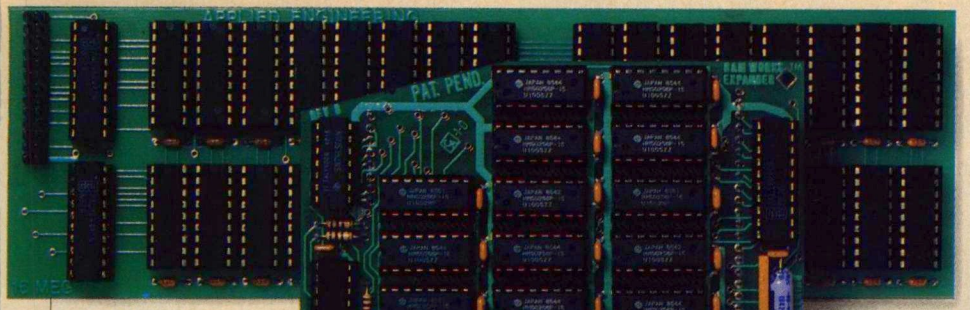
Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or multiple 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

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RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

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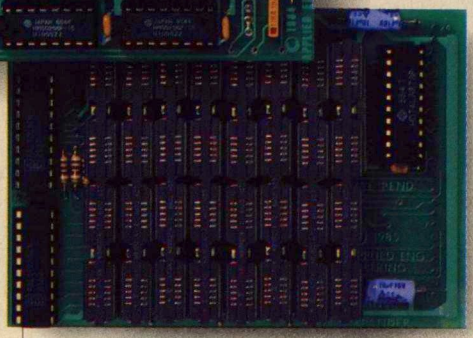
Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.



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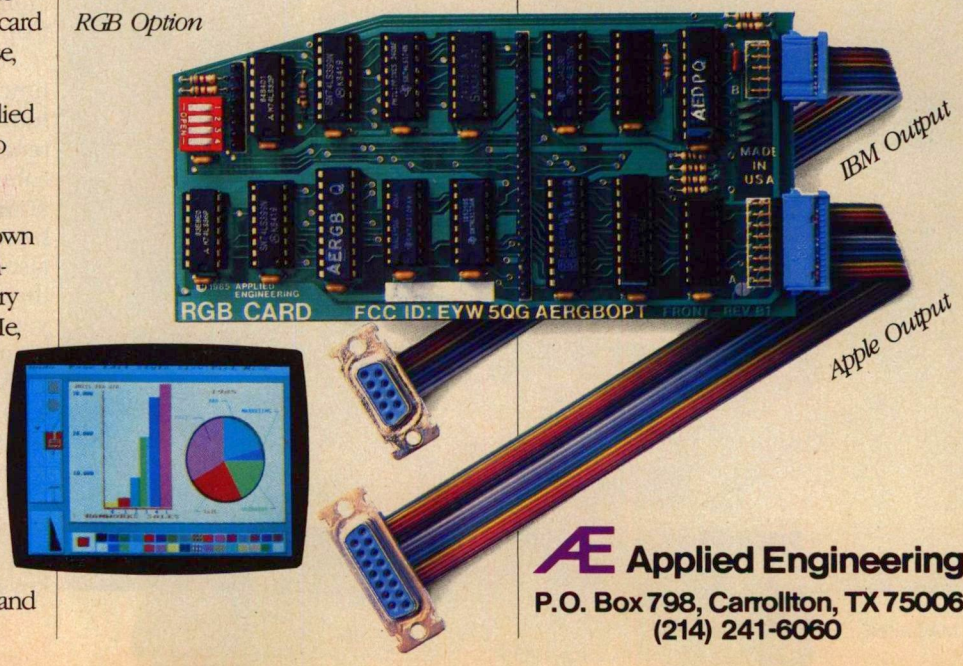

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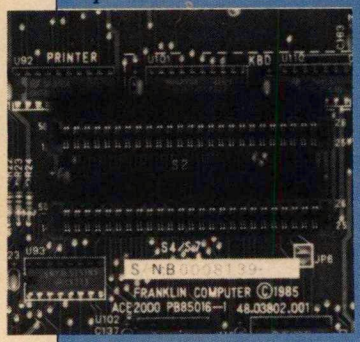
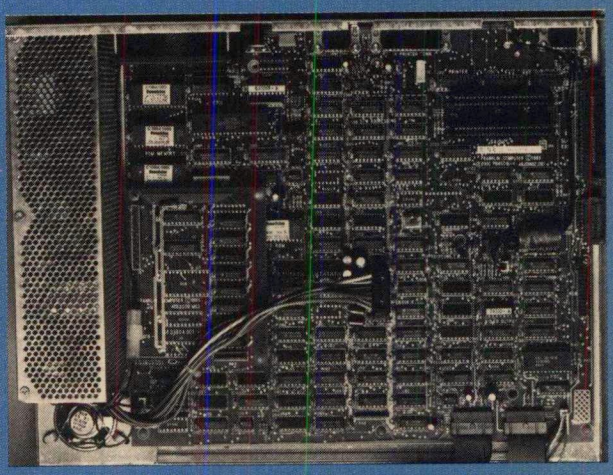
FRANKLIN ACE 2000 SERIES

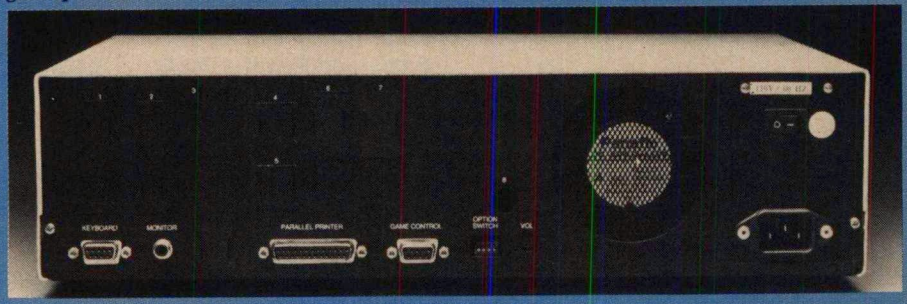
Franklin's clone is modeled after the Apple IIe.

The Franklin features a densely populated motherboard with a 67-watt power supply and two expansion slots.

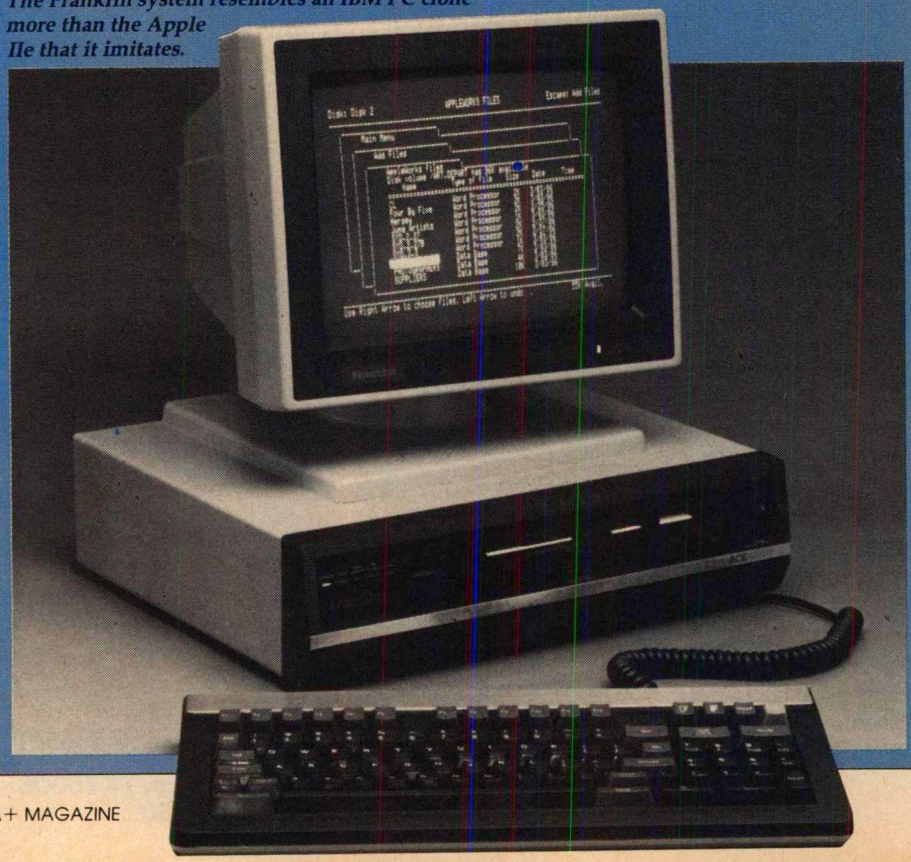




The back of the Franklin, showing the keyboard connector, monitor plug, parallel printer port, game port, and built-in fan



The Franklin system resembles an IBM PC clone more than the Apple IIe that it imitates.



a detached keyboard, a system unit that houses the disk drives and CPU, and a monitor. Internally, the Ace features a 65C02 processor, 128K of RAM, a 67-watt power supply (the Apple IIe's is 35 watts), two Apple-compatible expansion slots, and a built-in fan. It has internal connectors for Franklin-supplied RAM expansion, RGB video (which requires a $79 interface card), and a 16-pin joystick. The Franklin's video ROM generates either standard Apple- or Mousetext-compatible character sets.

Built into the back of the system unit's metal case are a parallel printer port, a speaker volume control, a nine-pin joystick port, a keyboard-connection port, a composite-video port, and a set of four DIP switches that let you configure the parallel port and select between the two video character sets. On the side of the unit is a port for connection with an external expansion chassis designed to accept more add-in boards. (Franklin itself doesn't manufacture such an expansion chassis, but it says two other companies are either making one or are interested in doing so.)

Another big difference between the Franklin and an Apple IIe is the keyboard. The detachable keyboard has a numeric keypad, 12 programmable function keys, separate Backspace and Delete keys, open-F and closed-F keys (these function like the open-apple and closed-apple keys when you run Apple programs), an ALT key, a Pause key, and a Break key for interrupting BASIC programs. In addition, some of the number keys in the numeric keypad double as the BASIC editing keys Clear Screen, Home, List, Run, Delete Character, Copy Screen Line, and Clear Line.

As delivered, the keyboard's 12 function keys are set to perform basic functions (copy, delete, lock, unlock, rename, catalog, and toggle 40/80-column display) under the supplied Franklin DOS 2, which is an enhanced knockoff of DOS 3.3. You can also program the function keys in either BASIC or assembly language, so you can use them for repetitive programming tasks.

All these keys seem like a good idea per se, but combined on one keyboard they create a layout that is significantly different from the Apple II's. This disparity will cause problems for those used to the familiar Apple layout. The open- and closed-F keys, for example, are located in the

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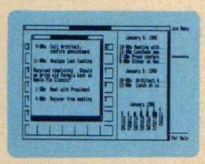

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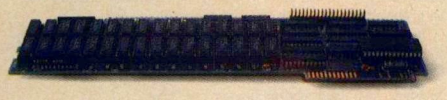

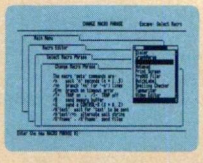

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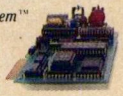

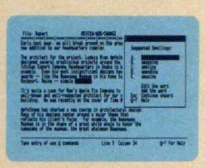

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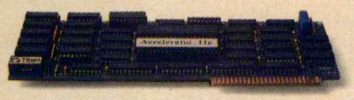

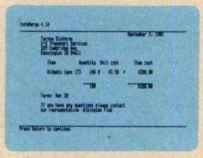

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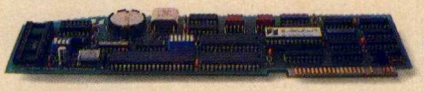

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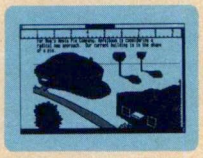

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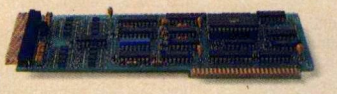
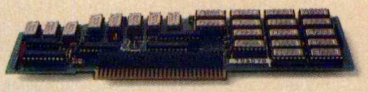
The big picture. Desktop Accessories pop-up from inside AppleWorks: graphic and text merging, envelope addressing, communications plus five others. **$69**

Checkmate MultiRam IIe™





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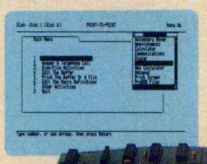

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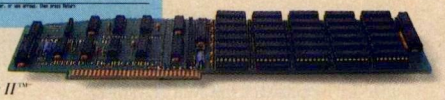

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Introducing the next generation of Pinpoint performance software, integrated with AppleWorks,™ to help you manage just about everything. Including the mess on your desk.

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△ **$125 Pinpoint Desktop Accessories and the Spelling Checker.**
Be sure to include the $29 RAM Enhancement Kit, FREE.

☐ **$129 Point-to-Point.**
☐ **$79 InfoMerge.**
☐ **$69 Pinpoint Desktop Accessories.**
☐ **$69 Pinpoint Spelling Checker.***
☐ **$29 Pinpoint Apple IIe Upgrade Kit.**
☐ **$29 Pinpoint RAM Enhancement Kit.***
☐ **$29 Pinpoint Modem Enhancement Kit.***
☐ **$8 Pinpoint Graphic Printing Kit.***

Pinpoint's software requires an Apple IIc, Enhanced Apple IIe with 128K, or Apple IIe with Pinpoint Apple IIe Upgrade Kit and 128K. We recommend two floppy disk drives, a UniDisk 3.5,™ hard disk or RAM disk drive.

*Requires Pinpoint Desktop Software.

Pinpoint™

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PINPOINT AppleWorks Desktop Accessories/Pinpoint Spelling Checker ◀

Computer Systems:
Apple IIc
Enhanced Apple IIe with 128K
Apple IIe with Pinpoint Apple IIe Upgrade Kit
Franklin 2000*
Video Technologies, Laser 128

PINPOINT IS FOR YOU

Whether you're one of over 800,000 satisfied AppleWorks users, own a RAM card, high-capacity disk drive, accelerator card or high-speed modem, or just need to get more work done every day, PINPOINT's Desktop Accessories are for you.

This product information report was prepared to help you confirm your decision to purchase Pinpoint's Desktop Accessory software programs for the Apple II computer.

AT YOUR FINGERTIPS

No other one piece of software does more to improve the performance and productivity of your Apple II than PINPOINT AppleWorks Desktop Accessories.

THE NEXT LEVEL FOR APPLE II

The next level in integrated software, Pinpoint offers unparalleled ability to realize the performance potential of your system. Pinpoint supports:

- ▲ 128K to 16MB RAM from Apple, AST, Applied Engineering and Checkmate
- ▲ High-capacity UniDisk 3.5 floppy disks
- ▲ ProFile, Sider and Corvus hard disks
- ▲ Titan Accelerator IIe, Applied Engineering Transwarp and MCT Speed Demon accelerator cards
- ▲ Apple, Hayes, Prometheus, and Zoom internal/external 300/1200 baud modems
- ▲ Graphics and text printing with Apple, Epson, Hewlett-Packard, Okidata and other printers
- ▲ Compatibility with dozens of interface cards

HERE'S WHAT PINPOINT DOES TODAY

The next level in convenience, no other software works from inside AppleWorks, Business Works, and other selected ProDOS software, to add the functionality of Pinpoint's Desktop Accessories. For starters, Pinpoint includes:

- ▲ Appointment Calendar
- ▲ Four-function Calculator
- ▲ Modem Communications Window
- ▲ Smart Telephone Dialer
- ▲ GraphMerge Graphics & Text Printing
- ▲ Notepad Baby Word Processor
- ▲ QuickLabel Envelope Addresser
- ▲ Memory-Writer Style Typewriter

HERE'S WHAT'S COMING FOR PINPOINT TOMORROW

The next level in open-architecture, Pinpoint can grow beyond the original set of eight Desktop Accessories to include up to 16 Accessories on the Pinpoint Desktop. For example, when they actually become available, you may want to add new programs like:

- ▲ Pop-up Spelling Checker
- ▲ Pop-up Thesaurus
- ▲ Pop-up Grammar Checker
- ▲ Instant Macro Keys
- ▲ Personal Check Writing
- ▲ Things to do Quick Lists
- ▲ Telephone Call Accounting
- ▲ Home Security and Appliance Control
- ▲ Travel Planner with Online Ticket Buying

In fact, some of these programs are just now becoming available from Pinpoint and other software developers.

VALUE THAT'S HARD TO BELIEVE

The next level in value, Pinpoint and optional Pinpoint Accessories are available nearly everywhere Apple Computers and Apple software is sold. Great software that becomes more valuable the more you use it, available today at very affordable prices.

With Pinpoint you get all this:

PINPOINT'S POP-UP FEATURES

- ▲ RAM resident with extended RAM support or disk-based Accessories.
- ▲ Pop-up from inside AppleWorks, Business Works, and other selected ProDOS software.
- ▲ Work with Catalyst, Mouse Desk and Prosel desktop managers.
- ▲ Always available. Closed-Apple-P pops-up PINPOINT's main menu can display up to 16 Accessory titles (8 supplied with the original Pinpoint program).
- ▲ AppleWorks' 55K desktop remains undisturbed with PINPOINT installed in RAM (basic 128K Apple II configuration).
- ▲ Open-Architecture. Uses ProDOS system files for Accessories—up to 16MB RAM each using segmented memory architecture.
- ▲ Write new Accessories all your own with the Pinpoint Toolkit.
- ▲ File and command compatible with AppleWorks.
- ▲ Open-Apple command support, with pull-down menus and dialog boxes.
- ▲ Context-sensitive, online help screens.
- ▲ Convenient 'Drag Mode' moves the pop-up menu anywhere on the screen.
- ▲ Customized Pinpoint disks can include one accessory, several, or all as desired to save floppy disk or available RAM disk space.
- ▲ Use with any ProDOS device.
- ▲ Not copy protected.

USE PINPOINT WITHOUT APPLEWORKS

Individual Pinpoint Desktop Accessories can be used as stand-alone applications without AppleWorks, Business Works or other primary application.

Select ProDOS BASIC from the Pinpoint menu to load BASIC. Pressing Open-Apple-P pops-up Pinpoint's main menu. Select the Accessory you wish to run and press RETURN.

Customized Pinpoint Disks

Pinpoint Desktop Accessories may be used individually, or in sets. All accessories are regular ProDOS system files, except the Dialer which is a RAM resident portion of the Pinpoint Dispatcher.

Accessories can be moved to and from any ProDOS 'working disk' to suit your individual requirements. This saves space on your 'working disks' and conserves valuable RAM disk space.

For example, you may wish to include only the Notepad, QuickLabel and Communications Accessories on your AppleWorks Database disks. Or just the Calendar, Notepad, Calculator, Typewriter and QuickLabel Accessories on your Word Processing and Spreadsheet disks. Or just use GraphMerge all by itself.

Copying Accessories

Use ProDOS Filer or Copy II Plus for copying Accessories on floppy disks; or you may use the Pinpoint RAM Enhancement Kit to automatically upload selected Accessories onto your partitioned RAM disk.

PINPOINT's POP-UP SPELLING CHECKER

One bungled word can spoil your entire document. But not with Pinpoint's pop-up Spelling Checker by your side.

The Spelling Checker is a new optional accessory that is added to the Pinpoint Desktop. Absolutely the most convenient way to produce letter-perfect AppleWorks documents.

The Spelling Checker requires PINPOINT or it will not run. Because the Spelling Checker actually uses AppleWorks' own editing power for automatic on-screen spelling corrections and page reformatting, the Spelling Checker works only with AppleWorks (word processing, spreadsheet and database modules).

Like other PINPOINT Accessories, the Spelling Checker pops-up from inside AppleWorks, ready anytime you want to check your work.

POP-UP SPELLING CHECKER FEATURES

- ▲ Checks documents of any size in memory.
- ▲ 60,000 word dictionary, refined from seven years of extensive use by over 250,000 people. Thorough testing has eliminated thousands of awkward, obscure, and antiquated words that might be incorrectly accepted as properly spelled words.
- ▲ Unlimited word capacity personal dictionary can be used for proper names, specialized terms, and frequently used abbreviations. This dictionary is limited only by ProDOS' 16MB maximum file size or the capacity of your disk.
- ▲ RAM resident Quick-Check list of frequently used words greatly speeds spell checking.
- ▲ Four spell checking codes: check individual words, paragraphs or documents; and optionally, elect not to display alternative spellings (i.e., for classroom use).
- ▲ Spell checking summaries: # words checked, # suspect words, # words corrected, and # added to personal dictionary. Summary display is optional.
- ▲ Configure default mode settings, including sound option, and paragraph/document spell checking summaries.
- ▲ One single-sided Apple 5.25" floppy disk can store the spell checking software, main dictionary and approximately a 3,000 word personal dictionary.
- ▲ One UniDisk 3.5™ can store AppleWorks, all eight original PINPOINT Desktop Accessories, the Spelling Checker plus both dictionaries at maximum capacity.
- ▲ For maximum performance, install the Spelling Checker on either a Hard Disk or partitioned RAM Disk using Pinpoint's RAM Enhancement Kit.

***Contact Pinpoint for more information.**

USING THE SPELLING CHECKER

- ▲ On command, check individual words, paragraphs or entire documents. Also checks words in spreadsheets and database entries.
- ▲ When an 'unknown' (misspelled) word is located a list of up to 10 suggested alternative words pops-up next to the unknown word.
- ▲ Highlight an alternative word, then press RETURN to automatically correct the word in place.
- ▲ 'Unknown' words may be added to your personal dictionary, edited in place, or left unchanged.
- ▲ Exit the Spelling Checker to PINPOINT or AppleWorks anytime.

NEW FOR SPRING 1986*

InfoMerge $79. On-screen, direct printing mailing program for AppleWorks. Automatically select names from AppleWorks, or manually scan data files forward/backward, add keyboard inputs, automatic reformatting, on-screen preview, then print. Again and again. Works with AppleWorks and with Pinpoint Installed!

Point-to-Point $129. Powerful telecomunications software with AppleWorks filecard interface, send/receive mail unattended (with clock), amazing conditional macros. XMODEM binary/text file transfers, 2400 Baud modem support and more.
Works with Pinpoint installed!

Pinpoint Toolkit $49. Ten handy new desktop accessories include programmer's calculator, pop-up Filer, accessory mover, video resource editor, resource converter, two screen print accessories, memory dump (window), the new RUN-RUN desktop environment, calendar printing accessories, plus a copy of "Inside Pinpoint", and complete reference manuals. For use with MICOL BASIC, KYAN PASCAL (available from Pinpoint) or ProDOS Assembler.

Pinpoint Apple IIe Upgrade Kit $29.00

- ▲ Permits Pinpoint and many 'new' Apple IIe software programs to run on plain Apple IIe's with 128K.
- ▲ Solves many of the compatibility problems older software programs have with the Enhanced Apple IIe.
- ▲ Includes Mouse Text Video ROM, exact copy of Apple's Character Generator ROM #342-0265 approved by Apple.
- ▲ Includes GTE or Rockwell 65C02 microprocessor.
- ▲ Handy chip puller included.
- ▲ Does NOT include Apple's proprietary 'CD' and 'EF' ROMs required for most mouse-based software. Apple Computer requires us to inform you that this Kit does not "Enhance" the Apple IIe, this Kit is only to be used on Apple IIe's, and this upgrade is performed at users' own risk.

Pinpoint RAM Enhancement Kit $29.00

- ▲ Configures partitioned RAM disks.
- ▲ Automatically uploads non-copy protected ProDOS applications and files to partitioned RAM disks.
- ▲ Includes a ProDOS RAM switcher for AppleWorks with Pinpoint and other ProDOS applications uploaded into RAM, such as *Business Works* accounting software, *Point-to-Point* communications software, or *InfoMerge* mail merge and print formatting program.
- ▲ Requires Pinpoint.

Pinpoint Modem Enhancement Kit $29.00

- ▲ Advanced modem software enhancement for Pinpoint's Communications Window.
- ▲ Logon macros with default communications setups.
- ▲ Keyboard and video character remapping (for encryption or terminal emulations).
- ▲ Selective character filtering.
- ▲ Required for Novation, Microcom and other non-standard external/internal modems or interface cards. Contact Pinpoint for details.
- ▲ Requires Pinpoint.

Pinpoint Printer Enhancement Kit $8.00

- ▲ Advanced installation utilities for non-Apple standard printers and interface cards.
- ▲ Simultaneous text and graphics printing.
- ▲ Epson FX, RX, LX, and MX-80 with GraphTrax +; Okidata 84, 92, 93, 192; H-P Thinkjet; Panasonic KX P1091, Smith-Corono D-200, Star Micronics SD-10 and SG-10 printers with standard interface cards, require the Pinpoint Printer Enhancement Kit to print graphics and text.
- ▲ Printer interfaces supported include: Generic BASIC Standard, Generic Pascal 1.1 Standard, Orange Micro Grappler Serial and Grappler + Parallel Cards, Star Micronics Grafstar and Grafstar II, Microtek Dumpling 64, Dumpling-GX, and RV-611C, Interactive Structures PKASO/U, and RC Systems Slot Buster.
- ▲ Contact Pinpoint for details.
- ▲ Requires Pinpoint.

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CIRCLE 152 ON READER SERVICE CARD

far upper right corner of the keyboard and are thus hard to reach when you're using a program, such as AppleWorks, that relies heavily on them. The cursor-control keys are in a diamond pattern within the numeric keypad, rather than in a line. The separate keys for backspacing and deleting will also cause some confusion in those used to the Apple II's single Delete key, and the Shift key is smaller and harder to locate easily.

Although most clone makers in the personal-computer world slavishly adhere to the original manufacturer's keyboard layout, Franklin departed from this practice, according to Strange, because "our focus was that most of the people haven't used an Apple, so they don't have a frame of reference. Most buyers are upgrading old Franklins or are upgrading from Atari and Commodore." In a sense, the keyboard represents a self-fulfilling prophecy—it will be much easier for those without Apple experience to use and will thus likely be more attractive to such buyers.

Hands On

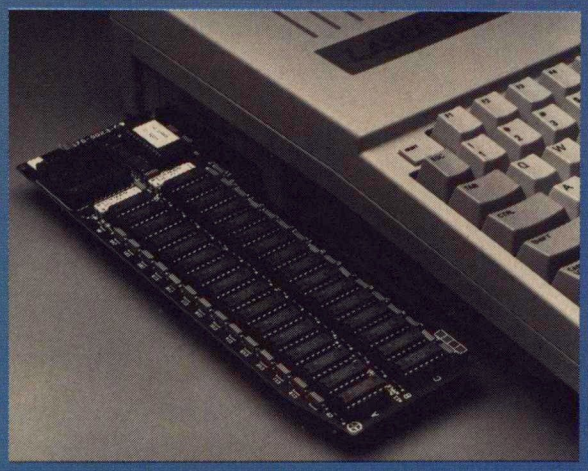
To check the Franklin's compatibility, I ran several popular Apple programs on it and tried a variety of third-party expansion cards. In operation, the Franklin's fan and disk drives were fairly noisy—noticeably noisier than Apple's drives or add-on Apple IIe fans.

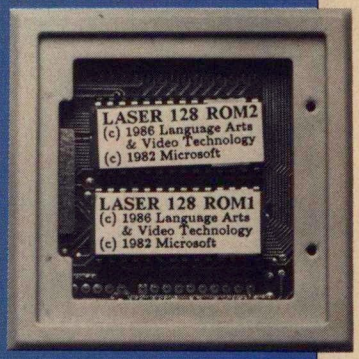
As for inserting internal expansion cards, the metal case slides open when you remove two screws, but it's still a good deal harder to get into than the IIe's flip-top arrangement.

One of the two internal expansion slots is designed to emulate the Apple's slot 2 and is intended for serial-interface cards. The other slot can emulate either slot 4 or slot 7 (you move a jumper on the main circuit board to choose which emulation you want). The machine worked fine with an Applied Engineering Clock Card in slot 4. Other cards didn't fare as well, though. The McT SpeedDemon coprocessor card didn't work in slot 4, but the Applied Engineering Transwarp coprocessor did. In slot 2, the Apple Expanded Memory card and a Microcom internal modem worked fine. If you use an internal modem, however, the piggyback design of such boards will cover up slot 4/7. If you really want to add RAM to a Franklin, the best course is to buy Franklin's own memory-expansion kits, which connect through a sepa-

LASER 128

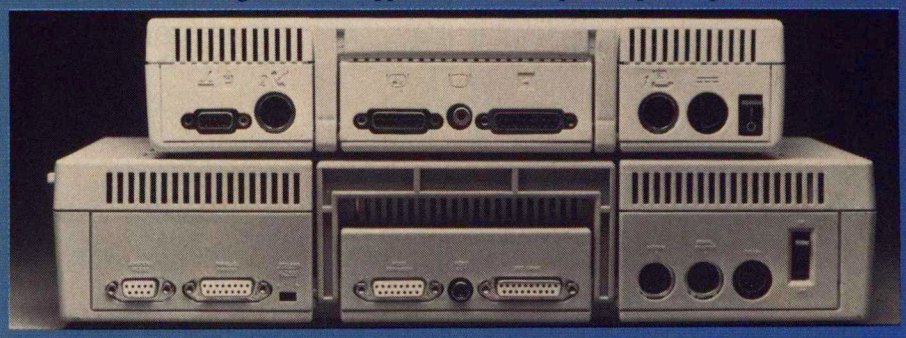
The Laser 128 is an imitation of the Apple IIc that adds a variety of features, including an expansion slot not found on the IIc.





Upgrading the software on ROM chips is simple; the Laser 128 has a trapdoor on the bottom that provides easy access to the ROMs.

The Laser 128 is a bit larger than the Apple IIc and adds a parallel printer port.



The Laser 128 system looks much like the Apple IIc that it imitates.

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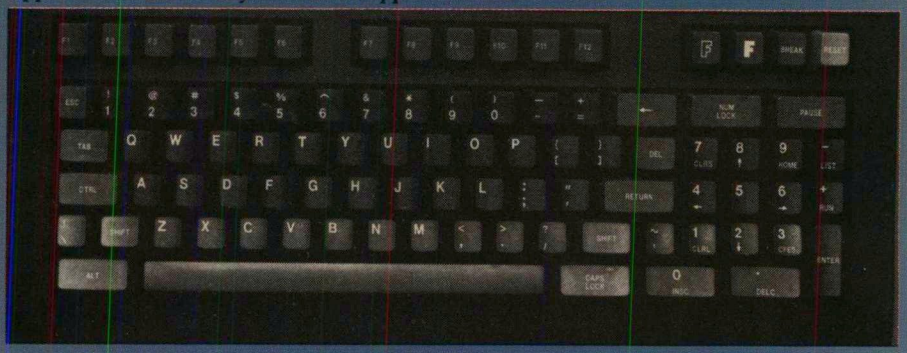
KEYBOARD COMPARISON

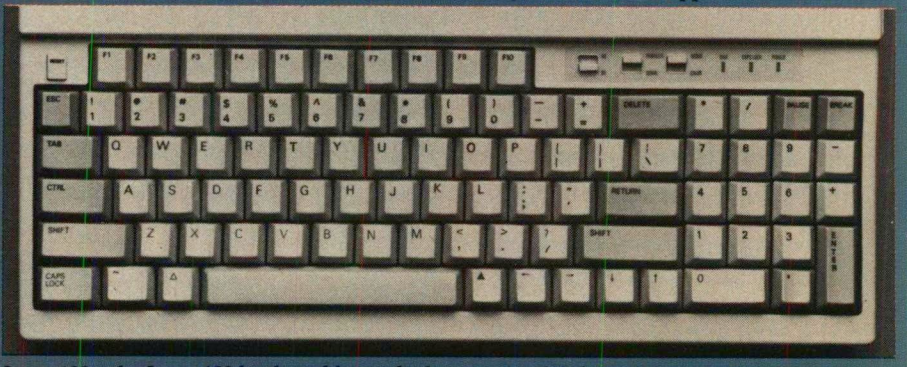
Both the Franklin and the Laser 128 try to improve on the Apple's keyboard by adding a numeric keypad.

Apple IIe—this is the keyboard most Apple users are familiar with.



Franklin Ace 2000 series—the Franklin keyboard is arranged quite differently from the IIe's.

Apple IIc—the arrangement of the IIc keyboard is very similar to the Apple IIe's.



Laser 128—the Laser 128 keyboard is much closer to Apple's layout than the Franklin's is.

rate port inside the case. The kits come with either 256K or 512K and are priced lower than Apple or third-party memory cards.

The parallel printer port worked fine. I configured a printer in AppleWorks as if the printer were connected through slot 1, and I experienced no problems.

The Franklin machine did fairly well at running Apple programs, but it had some notable problems. AppleWorks generally ran fine. With the Mousetext-compatible character display selected, the open-apple character on the AppleWorks menus appeared as open F. The machine also ran Multiplan, Word Juggler IIe, Cut and Paste, Dazzle Draw, and a few BASIC and compiled BASIC programs without any problems.

Although the Franklin machine ran AppleWorks fine the first couple of times I used it, it failed intermittently to load the AppleWorks program disk thereafter, even though I tried several different copies and versions of AppleWorks. When it wasn't having loading problems, the Franklin also ran copies of AppleWorks that I had modified with Pinpoint. When I tried to boot the Pinpoint Install disk, however, a screen message said the computer wasn't equipped to run Pinpoint.

The Franklin also couldn't run International Solutions' MouseWord and MouseCalc. The machine requires installation of the AppleMouse II card before it can run these programs. In fact, Franklin is working with International Solutions on a modified version of its software that will use the machine's function keys and cursor-control keys in lieu of a mouse. This version should be available in June, according to Franklin.

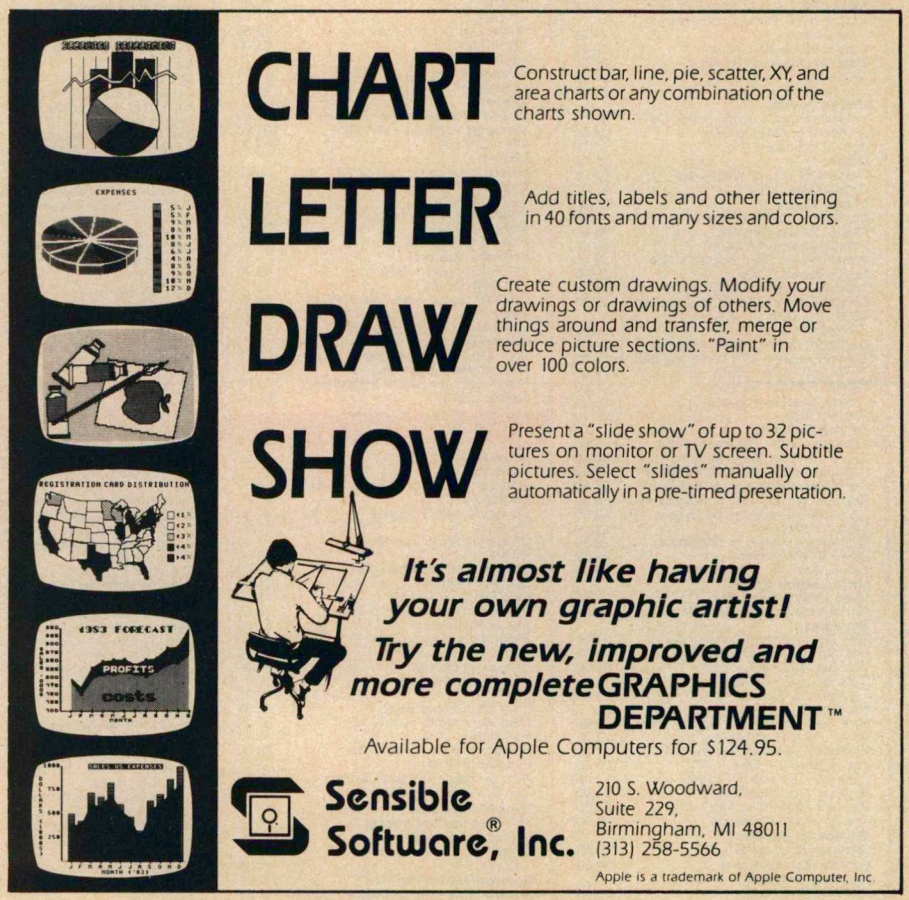
The Ace comes with a 90-day parts-and-labor warranty.

Overall Value

My experience with the Franklin 2200 didn't inspire confidence. When I received the machine from Franklin, one of the function keys had fallen off the keyboard and had to be pressed back on. Later, the Enter key broke off and couldn't be replaced. I attribute these problems to substandard packing materials in the shipping carton—it was impossible to get the machine out of the box without pulverizing the styrofoam packing, and it was impossible to repack the machine properly afterwards.

Beyond these relatively minor

CIRCLE 287 ON READER SERVICE CARD



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points, the issues of software compatibility and the intermittent disk-loading problems suggest a variety of bugs yet to be ironed out. The version of BASIC in the Franklin's ROM is one source of trouble. Franklin has modified its BASIC several times since last September, but although Michael Strange says, "We're migrating to a more compatible BASIC," he also says that such modifications won't go on forever. The company will release an upgraded version of the ROM BASIC in June, and existing users will be charged a nominal upgrade fee.

"We changed the ROM a lot in the first six months," Strange says, "but now, with the number of machines that are out there, if we keep changing the firmware, we'll drive everybody crazy. We're relying on software vendors to redo their software to eliminate the compatibility problems." He points to International Solutions' plan to modify its software and suggests that other companies will follow suit: "Software companies are jumping on the bandwagon and are changing their software to run with us. We let them do things Apple can't do—they can take advantage of our function keys for easier software operation."

LASER 128 FEATURES

The Laser 128 grew out of a collaboration between Language Arts of Portland, Oregon, and Video Technology Ltd. of Hong Kong. Language Arts is a software house that developed an Applesoft-compatible ROM for Franklin two years ago. Its president, Mike Brown, is also president of Central Point Software (of Copy II Plus fame), which distributes the Laser to dealers and sells it via mail-order to users. The Laser 128 is also distributed to dealers by Video Technology U.S., the company's American division in Chicago.

Video Technology is an electronics manufacturer that specializes in educational speech-synthesis toys, which are marketed by Sears and other major U.S. retailers. Its first computer was the Apple II Plus-compatible Laser 3000. About a year and a half ago, Language Arts' Brown met with Video Technology to discuss the use of the Applesoft-compatible ROM in a new Apple IIe/IIc clone, and Language Arts ended up doing much of the overall design work on the new machine.

The Laser 128 has been approved by the U.S. Customs Service as a noninfringing Apple II compatible, but that isn't the last word. Apple itself is no doubt examining the machine closely at this writing. If a lawsuit is merited, Apple will probably sue. In fact, Apple is already defending itself against a lawsuit Video Technology brought over the Laser 3000. On the other hand, Central Point is familiar with the ins and outs of piracy from its experiences with Copy II Plus. According to Central Point's Brown, the Laser 128 doesn't infringe on Apple's copyrights because Video Technology is a licensed user of Microsoft BASIC, which is the same BASIC Apple uses. "Video Technology paid about $100,000 to Microsoft to license its BASIC," Brown says. "Large sections of the ROM code are identical to Apple's because Video Technology licensed the BASIC from Microsoft."

Even with the Microsoft BASIC, however, the Laser's ROM has required extensive tinkering to make it as compatible as possible. "Our goal

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is 98–99% compatibility, and we're very much still in the development stage," says Brown. "That's why we put a little trapdoor in the bottom of the machine, so we can update ROMs of initial purchasers." At the time of this writing, the Laser 128 was scheduled for volume shipments the first week of April. ROM updates will be offered regularly, and registered owners can pay a $25 update charge to get each new set of ROMS as they come out, if they want the added compatibility each revision offers. During the week I had the Laser in mid-March, I received a ROM update that cleared up several compatibility problems.

"Our philosophy is that we want to keep the machine cheap," says Brown. "We want to make it available. We're not trying to compete with Apple's distribution channel—we're trying to expand on it and get this unit out wherever we can. We're trying to create a much broader Apple-compatible market."

Despite the ongoing ROM updates and the cloudy legal issues, the Laser is a very likeable machine. The Laser 128 looks much like the Apple IIc: an 11-pound transportable unit containing a built-in disk drive, keyboard, and CPU. Inside, the Laser comes with a 65C02 processor, 128K of RAM, and built-in RGB output that you access through a video-expansion port on the rear of the machine. An extra connector inside lets you add an internal memory-expansion board such as Applied Engineering's Z-RAM. (Central Point's Brown says he wants to encourage Applied Engineering to design a RAM board for the Laser and that he'll build one himself if Applied Engineering decides against it.)

On the back of the case, the Laser offers all the same ports that are available on the Apple IIc: two serial ports, a mouse/joystick port, a composite-video port, an RGB video port, an external-disk-drive port, and a switch to select either a standard or Dvorak keyboard layout. The one addition on the back of the unit is a parallel printer port, which the Apple IIc lacks.

The right side of the machine has an earphone jack and volume-control knob like the IIc's. On the left side is the Laser's most significant added feature: an Apple IIe-compatible expansion slot. You can plug an add-in board directly into this slot, where it sticks out of the computer's side, but Video Technology will be releasing a two-slot expansion box in June that can connect to this port and house add-in boards in greater safety.

On the bottom of the machine, a switch lets you select 50Hz or 60Hz video output (the 50Hz setting is used in Europe, and it also improves the resolution on a flat-panel display). You'll also find a disk-drive adjustment screw here and a removable metal door that provides access to the machine's plug-in ROM chips.

The Laser has a IIc-compatible keyboard, plus a separate numeric keypad and a row of ten function keys along the top. The cursor control, apple function (they're open and closed triangles here), Delete, and other keys are exactly where they are on a IIc. The only extra keys are the Pause, Break, and Enter keys on the numeric keypad and the row of function keys. Brown says Central Point has kept the keyboard as compatible as possible because it hopes to sell a lot of Lasers to schools, and close compatibility with an existing base of

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THE APPLE-COMPATIBLE FUTURE

Aside from pure compatibility, the issues that will make or break any Apple II clone are Apple's willingness to let such a machine exist and third-party vendor support. Assuming these two factors are favorable, the appearance of two Apple IIe/IIc compatibles is a boon to the Apple market. It puts more of these machines into more people's hands; creates a wider market for and acceptance of Apple software and peripherals; and, in the words of more than one Apple third-party vendor, rejuvenates what has been a fairly stagnant market in a world where more and more users and vendors are jumping to the IBM camp. Other vendors aren't quite as optimistic, however.

According to Dave Larsen, president of International Solutions of Sunnyvale, California, and former marketing manager for the Apple IIc at Apple, clones are vital to Apple's

"If I were dictating philosophy at Apple, I would be welcoming clones at this point."

DAVE LARSEN
PRESIDENT,
INTERNATIONAL
SOLUTIONS

continued dominance of the low-end computing market. "For Apple's sake," he says, "for them to maintain market share in the low-end computing category, the compatibles just have to be there. If I were dictating philosophy at Apple, I would be welcoming clones at this point."

Larsen hasn't yet seen the Laser 128 in action, but he's skeptical about Michael Strange's notion that software vendors will strive to alter their programs to achieve Franklin compatibility. "The biggest problem software developers have today is reasonable distribution to move their products. If a software vendor can be assured that a hardware vendor will private-label its software or move it through the hardware vendor's own distribution channel, the software vendor will make its software compatible. If it's a minor modification that doesn't cost anything, vendors may do it, too."

Modifying software to use Franklin's function keys isn't a minor modification, however, so unless vendors can make attractive distribution deals with Franklin, "people aren't going to go through the expense just to take advantage of the function keys," Larsen says.

At Pinpoint Publishing in Emeryville, California, president Greg Hastings has worked with Central Point Software and the Laser since last August. He's used a Laser for months and currently has orders in for two more. "I'm very pleased with the machine," he says. "We had one minor problem with a BASIC routine in our Micro Cookbook program, but otherwise the Laser has worked fine." Hastings has used the Laser with both the AST SprintDisk and Apple Expanded Memory cards and hasn't had a problem with either of them.

Pinpoint's Install disk doesn't currently run with a Franklin, and Has-

". . . People can buy a machine with Apple functionality for Commodore prices."

GREG HASTINGS
PRESIDENT,
PINPOINT
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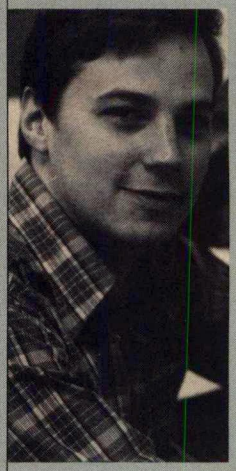
tings is aware of the problem. Making Pinpoint Franklin-compatible, however, isn't a top priority, he says. "It's a medium priority for us. We're working with an old Franklin machine, because Franklin hasn't sent us a new machine yet. Making Pinpoint compatible with them is a medium priority because of their market share—we've shipped about 35,000 copies of Pinpoint, but we've gotten only two or three calls about Franklins."

As to the benefit of clones, Hastings thinks the Laser 128 will make a difference: "It opens up three great areas of the market," he remarks. "There's the second-machine market, where people have gotten to know their Apple and are getting a lot out



"I don't think compatibles offer much . . . They just take business away from Apple. I'd rather have a IIe myself."

DAN POTE
PRESIDENT,
APPLIED
ENGINEERING

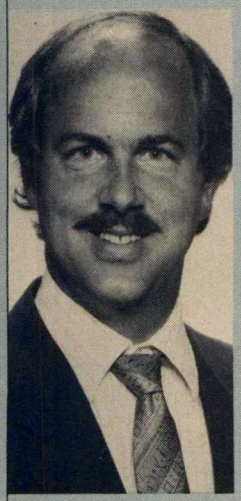
of it and want a second machine; there's the upgrade market, where people are moving up from an Apple II Plus; and there's the department-store market, where people can buy a machine with Apple functionality for Commodore prices."

At Applied Engineering, whose best-selling RamWorks card fits only the IIe's auxiliary slot (and is thus incompatible with both the Franklin and Laser 128) but whose other cards are compatible with the two clones, president Dan Pote isn't too excited about the Franklin and Laser. "The word *compatible* is a meaningless word nowdays," he says. "People buy machines that say they're compatible, and then we get calls from them when our stuff doesn't work. I don't think compatibles offer much—they're not significantly less expensive, and I don't think they expand our market. They just take business away from Apple. I'd rather have a IIe myself."

Brøderbund Software of San Ra-

Four industry leaders give their views on how clones will affect third-party vendors.

fael, California, ships more Apple II software than any other third-party vendor. Gary Carlston, the company's president, says he's never given the issue of Apple compatibles much thought. "Nobody ever had any success as a compatible. I think a lot of the Apple's appeal is that it's like the Volkswagen of computers—you know what you're getting, and you know where you can get parts. I'm not sure people are that price-sensitive. A lot of people would like to have an Apple who can't afford one, but given that one of the main reasons for buying an Apple is to know for sure what they're getting, I'm not sure a lot of people will buy somebody else's computer instead." Unlike some other industry figures, Carlston isn't too concerned about the stagnation of the Apple II market. "I don't think the machine has been



"The Apple's appeal is like . . . Volkswagen's. You know what you're getting, . . . and where you can get parts."

GARY CARLSTON
PRESIDENT,
BRØDERBUND
SOFTWARE

pushed to its limits, and I think the market will respond very favorably to whatever enhancements that Apple comes out with." In addition, a new, enhanced II-series computer would enable Apple to lower the prices on its existing machines in order to compete more effectively with the clone makers.

As for the effect of clones on the Apple II market, Carlston isn't expecting anything dramatic. "It's great if compatibles sell more software, but it certainly isn't a big part of our business plan that the market's going to expand because of compatibles."

Apple computers is particularly important there.

The function keys are factory-programmed to produce control characters such as Control-A and Control-X. Unlike the Franklin's function keys, they are not programmable and are thus not very useful. Above the numeric keypad are switches for toggling a 40- or 80-column display, selecting monochrome or color output, and switching between the serial and parallel printer ports.

In operation, the Laser felt very much like an Apple IIc. Its disk drive was quiet, and the machine's operation was very consistent—if a hardware or software product worked with it, it worked the same way every time. The unit has an external power transformer (as the IIc does), but its cords are longer than those on the Apple model, so you have more flexibility in placing the computer and transformer.

I tested hardware compatibility by printing on an ImageWriter, using the Laser's optional serial cable (no problems here), and by plugging various cards into the expansion slot. The Laser worked perfectly with the McT SpeedDemon, Applied Engineering Transwarp, Apple Expanded Memory Card, Applied Engineering Timemaster clock, and Microsoft CP/M Softcard. The port didn't work with my Microcom internal modem, but then you would probably use the dedicated serial modem port on the rear of the machine for communications.

In the software department, the Laser ran AppleWorks, Pinpoint, Dazzle Draw, Word Juggler, Mouse Calc, Mouse Budget, and BASIC programs without a hitch. Programs that display the open-apple symbol on an Apple display an open triangle on the Laser. When I tried Cut and Paste and Multiplan, the programs ran fine, but a few garbled characters appeared in the programs' menus—nothing serious enough to make the programs unusable, though.

The version of the Laser I received came with a DOS clone called Universal DOS, but Central Point's Brown says Central Point won't be selling DOS with the machine. "Everything for the Apple comes with the DOS on it. We see this machine as an appliance. If people want DOS or Pascal, they can go out and buy it," he says. The Laser 128 comes with a 90-day parts-and-labor warranty.

Continued on page 44

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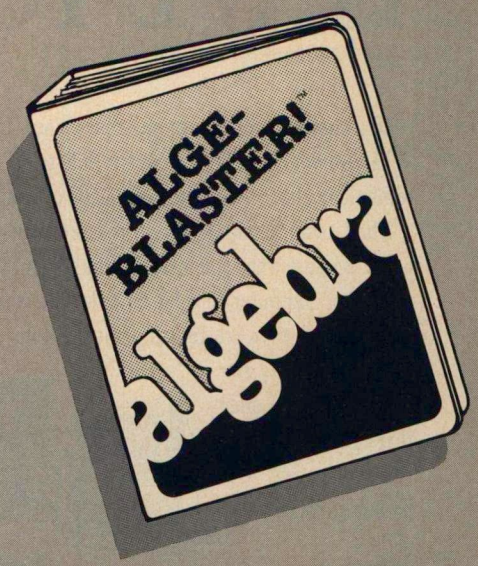

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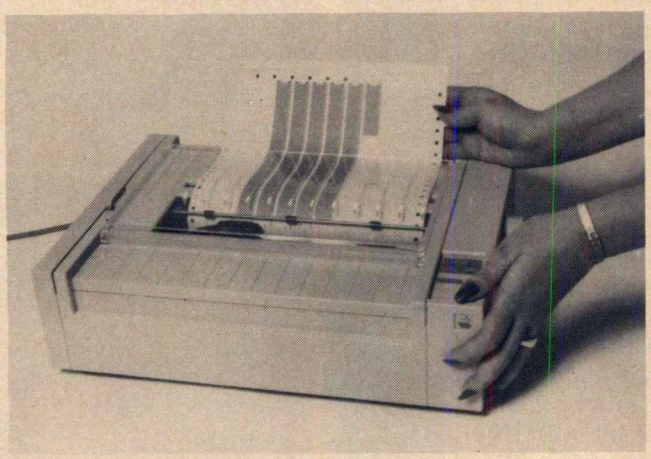

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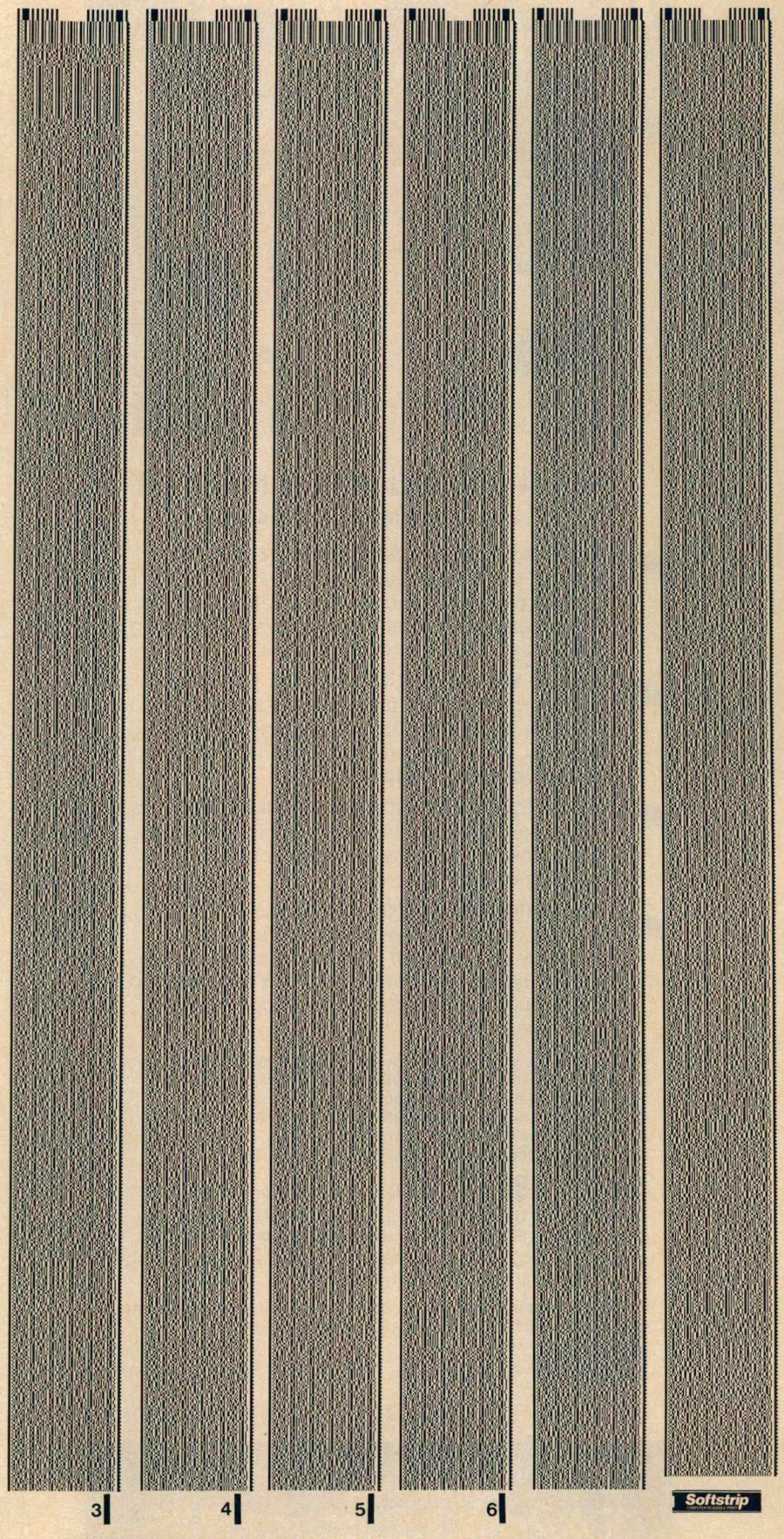

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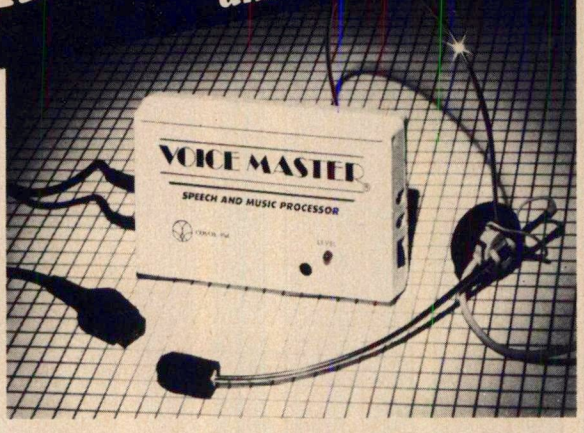

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VISA MasterCard *For Faster Service on Credit Card Orders only:*

ORDER TOLL FREE 1-800-523-9230

COVOX INC. (503) 342-1271
675-D Conger Street, Eugene, OR 97402
Telex 706017 (AV ALARM UD)

Continued from page 41

The Laser 128 felt like a solid, highly compatible machine compared with the Franklin. It is easier to set up, easier to add boards to, and easier to use. It is also more compatible and costs less. The compatibility and performance problems I experienced were quite minor compared with those I found on the Franklin, and I was convinced by the people at Central Point and other vendors that whatever problems I'd noticed would be ironed out by the time volume shipments began in April. (In fact, many of them cleared up with the ROM update I got.) For Central Point's price of $395, this product is almost irresistible, especially for Apple IIe owners who want a second machine as well as for Apple II Plus owners who want to upgrade. Counting the addition of a low-priced monitor, you can have a system that does everything an Apple IIc does, and more, for less than $500.

The overriding consideration for would-be purchasers of either the Laser 128 or the Franklin Ace is how well they run Apple software. Either a machine works like an Apple or it doesn't, and in this department, the Laser 128 is the clear winner. ✚

Charles Rubin is a consulting editor at A+. His latest book, Command Performance: AppleWorks, *was recently published by Microsoft Press. He is also the author of* AppleWorks *and* The Endless Apple, *also from Microsoft Press.*

PRODUCT INFORMATION

Franklin Ace 2000, 2100, 2200
Franklin Computer Corporation
Route 73 and Haddonfield Road
Pennsauken, NJ 08110
(609) 488-0600
List Prices: Ace 2000, $795; Ace 2100, $895; Ace 2200, $995. Memory-expansion cards: 256K, $119; 512K, $179. RGB card: $79

CIRCLE 365 ON READER SERVICE CARD

Laser 128
Central Point Software, Inc.
9700 S.W. Capital Hwy., #100
Portland, OR 97219
(503) 244-5782
List Prices: Laser 128, $395; external disk drive, $159.95; RGB, parallel, serial cables, $29.95 each; expansion box (available in June), approximately $49.95

CIRCLE 366 ON READER SERVICE CARD

What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."
—InfoWorld

"AppleWorks wiped out Symphony... The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering . . ."
—San Jose Business Journal

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."
—inCider

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks. . . I like the product so much that I am buying one for my own system."
—A+ Magazine

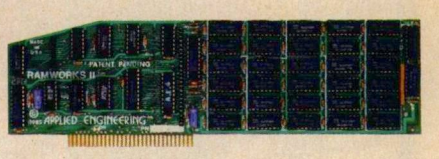
"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars... For my money, Applied Engineering's RamWorks II is king of the hill."
—inCider

As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

Because RamWorks and Z-RAM have a mesmerizing list of characteristics that, as you use them, will change your perceptions of an Apple computer forever. Achieving a level of speed and performance most critics claim is the best they've ever seen. But we want to do more than impress the experts, we want to impress you!

Applied Engineering stands ready to solve your expansion needs today and tomorrow with the largest and best supported product line in the industry.

Call Applied Engineering at 214-241-6060, 9 am to 11 pm. To get the very best.



RamWorks II®

The recognized industry standard for memory expansion in the Apple IIe.

AE™

214-241-6060

ILLUSTRATION BY CARLOS LLERENA AGUIRRE

Finding your way through the information jungle

with specialized on-line & software resources

SALES AND MARKETING DATABASE STRATEGIES

Suppose you're a sales and marketing manager. Your major function is to manage a sales force, as well as to be a member of a marketing team whose function it is to develop new product ideas, campaigns, sales material, and so on. To bag customers, you need information. The more you know about potential customers, the product, the competition, and the market, the more victories you'll score.

So get ready, all you information hunters, and pack up your Apple for a trip into the richest forest this side of the Amazon, the Information Jungle.

You can't see the Information Jungle; you can only sense it. It's out there, though. Hundreds of species of data inhabit it, and they all share one characteristic: They can be trapped in a database.

To many of you, a database is a piece of software that you buy at the local computer store for storing recipes, producing mailing lists, or preparing reports. (For more information about such software, see "Using Off-the-Shelf Database Programs" accompanying this article.)

The other type of database useful for sales and marketing doesn't run on your Apple but on a distant computer that you access by telephone. The so-called commercial databases are businesses, not software. Many firms make a lot of money by collecting information, putting it into electronic form, sometimes analyzing it, and then selling it to individuals and companies.

You may be familiar with the names of some on-line services—such as Dow Jones News/Retrieval, The Source, and CompuServe—that contain databases, but you probably haven't heard of the many databases that are highly specialized for sales and marketing applications. To uncover them you simply need to know where they are, how to get at them, and whether the trip is worth it.

Pack up your Apple for a trip into the richest forest this side of the Amazon, the Information Jungle.

The Quarry: Databases

Our first encounter is with AMI (Advertising and Marketing Intelligence), which is a product of The New York Times Company, available through Lexis or Nexis. AMI provides abstracts of articles in more than 60 publications on advertising, marketing, and the media. The database covers new products, consumer trends, sales promotions, and other information that can be valuable to the marketing community. The database goes as far back as 1979, focuses primarily on the United States (although it does include some international coverage), and is updated daily.

If you're a market researcher, then FIND/SVP Reports and Studies Index will be of interest to you. This database contains well over 10,000 citations, along with abstracts of available market-research reports, studies, and surveys of 55 different industries.

FIND/SVP, which is updated once a quarter, contains consumer and product studies; surveys; polls; and company and industry reports from investment firms, newsletters, and other databases relating to specific industries or products. The database's information begins in 1977 and covers international topics.

Another database for market research is the Frost & Sullivan Research Report Abstracts and Index to Frost & Sullivan Market Research Reports. The entire database comprises only reports produced by Frost & Sullivan, but when you're as well known as Frost & Sullivan, you can get away with that.

The database cites more than 1500 Frost & Sullivan reports, along with abstracts in industries such as chemicals, communications, food, health, consumer products, data processing, defense, electronics, instrumentation, machinery, and transportation. Each report deals with market share and size by products, as well as companies. This database also covers international topics, begins in 1983, and is updated monthly.

If you have anything to do with selling to corporations, especially when they move or hire new employ-

ees, then Sales Prospector is for you. The Sales Prospector database is the well-known *Sales Prospector* newsletter put on-line.

The target audience of the Sales Prospector is marketing analysts and sales representatives. The database is grouped into 15 geographic domestic areas. This database is also updated monthly.

Tracking Consumers

Now that you know a little about how to gauge the market and find some big commercial customers, what about the little guy, the consumer? Is he covered?

Yes, amply. For instance, consider Consumer Spending Forecast, which contains more than 800 quarterly and annual time series on consumers' personal spending, or Market Potential, which is a combination of census information and a host of consumer surveys coupled with a report generator. With this system, you can find out how many of a certain type of item were bought in a variety of sample areas including Standard Statistical Marketing Areas (SMSAs), market areas defined by Selling Areas-Marketing, Inc. (SAMI), and so on.

If your quarry is adults, you can find out what they're thinking with the Roper Reports, which contains the attitudes and opinions of more than 2000 U.S. adults on advertising, business, communications, consumer behavior, the economy, life-styles, the media, personal finances, and political issues. Just in case Americans are fickle, the database is updated ten times a year and goes back as far as 1981.

Did you score a hit—i.e., how is your product or market segment doing? To check, you can use databases such as Neilsen Retail Index or Selling Areas-Marketing Inc. (SAMI), which both cover many different consumer products, or specialized databases such as COFFEELINE, which tells you how to grow, market, and package coffee.

Intelligence Tidbits

So far, we have considered only databases that provide marketing and sales information exclusively: Who sold what to whom, for how much, and so on. But what about the covert-operations component of sales and marketing—competitive intelligence?

As any intelligence professional or late-night spy movie will teach you, you can rarely get the "big picture" from one piece of information. A lot of little, seemingly unrelated tidbits and databases are even handy for keeping track of employees' birthdays. A birthday greeting at the right time can do more to motivate a salesman than a contest can.

My favorite products for keeping this kind of information are database-management programs such as Profiler, Versaform, and PFS:File and its companion PFS:Report.

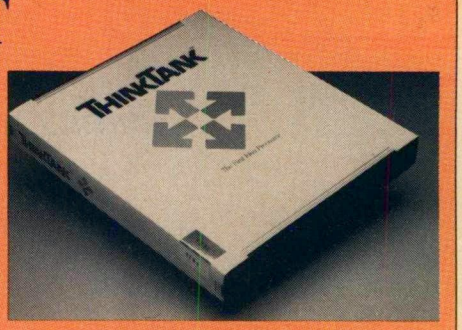
PFS:File and **PFS:Report**
Software Publishing Corporation
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910
List Price: $125 each
Requires: Apple II, II Plus, IIe, or IIc
CIRCLE 369 ON READER SERVICE CARD

THINK ABOUT IT

Sales and marketing managers often have thoughts and ideas that are worth saving and exploring. A novel approach to arranging and outlining these ideas is to use ThinkTank, a program that its publisher calls an idea processor.

ThinkTank, which is sort of an electronic answer to 3 × 5 index cards, helps you organize your thoughts. Using an outline format, you enter your thoughts and ideas into the program, amplify them, move them around, print them out, and/or manipulate them in other ways.

ThinkTank does indeed help you bring organization into your thoughts and forces you to examine them in the cold, green phosphorous light of your monitor. If you're highly mobile, however, or prone to "burst thinking" in the car or on the train, ThinkTank will be of much less value to you than it will be to your more office-bound counterparts.



ThinkTank
Living Videotext, Inc.
2432 Charleston Road
Mountain View, CA 94043
(415) 964-6300
List Price: $150
Requires: Apple II, II Plus, or IIe
CIRCLE 368 ON READER SERVICE CARD

USING OFF-THE-SHELF DATABASE SOFTWARE

Sales managers must track many types of information about their customers and sales staff, and database software can help them organize this material and even turn it into reports.

They need to record information about sales calls such as the date, the topic of discussion, what they sold, frequency of successful sales, requests for follow-up appointments, and so on. Another item to note is their customers' fiscal year so they can push for orders at the end of the year, when the customers may have money left over that they need to spend quickly.

Database programs are also valuable for storing information on sales staffs. Managers can note names, addresses, phone numbers, and the like,

provide the breakthroughs, and a lot of tidbits are available. Are you in a business that advertises in newspapers or magazines? If so, then consider using the Adtrack database. Adtrack contains references to one-quarter-page or larger advertisements that have appeared in more than 160 major U.S. consumer and business periodicals.

What about snippets that might appear in a newspaper? VU/TEXT Information Services has the full text of 17 daily newspapers and news wires from around the United States. Although a new tread design for a radial tire might not make the front page of the New York or Boston newspapers, it very well could in the *Akron Beacon Journal* (which is available on VU/TEXT).

If you want to monitor articles from general-interest magazines, then use Magazine Index, which covers more than 400 popular magazines published in the U.S. and Canada. It contains more than 1.2 million citations, dating back as far as 1959. You can call up the full text for at least 85 of these publications on-line, using Magazine ASAP, Magazine Index's companion database.

To search through specialized trade publications, use Trade Index, which covers more than 300 trade magazines, as well as Trade and Industry ASAP, which has full text for more than 105 of them.

Searching these databases periodically, using keywords that pertain to your industry or your competitors' name, can yield information you never thought possible.

How can you get at this wealth of information? All you need is your Apple, a modem, some communications software, and a subscription to the data service you want to access or to an intermediary such as Western Union's InFact.

Getting a subscription is simple. Just call the company that publishes the information, get its subscription agreement, read it, sign it, send it back with a check, and you're on-line! This method works fine if your organization is large and is going to use many databases fairly often. What if you're just a small guy, though? You don't want to shell out a few hundred bucks each time you want to try using a database, not to mention that learning the commands for many databases is like trying to master 15 different word-processing programs at once—you get each one almost to work but never get any one of them to work just right. Enter InFact.

An Expert Guide

You can use InFact through Western Union's Easylink service, but InFact is nothing like Easylink or anything else you have seen before.

What does InFact do? It lets you type English queries for databases. It then automatically, invisibly translates your English into the required syntax for the database—you don't have to learn the nuances of each database you work with. InFact takes care of that for you and then logs on and retrieves the information.

Other aspects of InFact's service are flat fees (no matter how long it takes for your search to run, you are charged a flat price for the search, and if nothing comes back, you don't have to pay anything except the minimal connect-time charge), document retrieval (the service sends out copyrighted photocopies the next day via the U.S. Postal Service or Federal Express), as well as access to more than 650 different databases without paying a subscription fee or monthly minimum.

InFact makes using many of the databases we have mentioned in this article—in addition to others—easy and profitable.

Cost-Effectiveness

The question that plagues many of you is "How do I know that using these databases is cost-effective?" As you can see from the accompanying

Profiler
PM Software
19731 Providence Lane
P.O. Box 1788
Huntington Beach, CA 92647
(714) 963-2221
List Price: $89.95
Requires: Apple II Plus, IIe, or IIc
CIRCLE 370 ON READER SERVICE CARD

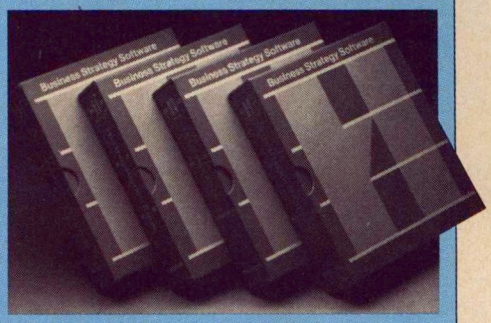
Versaform
Applied Software Technology
1350 Dell Avenue, Suite 206
Campbell, CA 95008
(408) 370-2662
List Price: $69
Requires: Apple II, II Plus, IIe, or IIc
CIRCLE 371 ON READER SERVICE CARD

DEVELOPING SALES STRATEGIES

Borrowing from the fascinating field of computer science called artificial intelligence, Human Edge of Palo Alto, California, has created the Edge series, a group of programs to help sales people plan strategies for dealing with various situations.

The series comprises "knowledge bases" gleaned from experts in fields such as sales management, communications, and negotiations. The programs allow you to sit down and "talk" to them, after which they suggest courses of action for you to take to solve particular problems.

For example, The Sales Edge can provide an individually tailored strat-



egy for dealing with specific customers, based on each customer's traits. Similarly useful are The Management Edge, which guides managerial actions; The Negotiation Edge, for bargaining; and The Communications Edge, which helps you prepare for meetings and conversations.

The strategies these programs give you are not plans that you should follow blindly, but using this software is an interesting way to check your own assumptions or instincts about your customers.

The Sales Edge, The Management Edge, The Negotiation Edge, and **The Communications Edge**
Human Edge
2445 Faber Place
Palo Alto, CA 94303
(415) 493-1593
List Prices: The Sales Edge and The Management Edge, $250; The Negotiation Edge, $295; The Communications Edge, $195
Requires: Apple II, II Plus, IIe, IIc, or Macintosh
CIRCLE 372 ON READER SERVICE CARD

SALES AND MARKETING MANAGERS' GUIDE TO ON-LINE DATABASES

DATABASE	DESCRIPTION	UPDATES	PRICES
ADTRACK The Kingman Consulting Group, Inc. Energy Park Business Center 1421 Energy Park Drive St. Paul, MN 55108 (612) 646-6558	References to advertisements bigger than ¼ of a page in 160 major U.S. consumer and business periodicals.	Monthly	Connect time, $45/hour; does not include other Dialog charges
Advertising and Marketing Intelligence Service Mead Data Central, Inc. P.O. Box 1830 Dayton, OH 45401 (800) 227-4908	Abstracts from more than 60 publications on advertising, marketing, and media. Covers new products, market research, consumer trends, and so on. Many are offered full text through Mead Data's Nexis service.	Daily, Monday–Friday	Requires Nexis subscription—$165 one-time software charge; monthly $50 for Nexis-only subscribers; connect-time charge $30–$35 an hour (depending on telecommunication method), and $9 peak, $6 off-peak per search.
Consumer Spending Forecast Chase Econometrics 150 Monument Road Bala Cynwyd, PA 19004 (215) 896-4843	Part of the Consumer Forecasting service of Chase Econometrics. Includes monthly historical information and forecasts data, demographics, analysis, seminars, and so on.	Monthly	Based on individual client request
FIND/SVP Reports and Studies Index Information Products Department 500 5th Avenue New York, NY 10101 (212) 354-2424	Contains more than 10,000 citations with abstracts to publicly available market-research reports and studies. Covers more than 450 U.S. and non-U.S. publishers.	Quarterly	Connect time, $79/hour; off- and on-line remote-printing charges, $25/hour; user manual, $39
Frost and Sullivan Research Report Abstracts, Index to Frost and Sullivan Market Research Reports Frost & Sullivan, Inc. 106 Fulton Street New York, NY 10038 (212) 233-1080	Contains 1500 citations to Frost & Sullivan market-research reports.	Monthly	Open access (non-subscription), $35/hour; four levels of subscription pricing available; on-line citation charges, 5 cents a citation or less
Magazine Index, Magazine ASAP Trade and Industry Index, Trade and Industry ASAP Information Access Company 11 Davis Drive Belmont, CA 94002 (415) 591-2333	Contains citations to hundreds of consumer (magazine) and specialized (trade and industry) publications. ASAP contains citations and full text of many of the articles listed in the indexes.	Monthly	Various—based on provider. Example is $84/hour connect-time charge on Dialog
MarketPotential Donnelley Marketing Information Services 1351 Washington Blvd., Fourth Floor Stamford, CT 06902 (203) 965-5400	Data-retrieval and -analysis system that contains data from the 1980 census. Focuses on market definition/research.	Annually	Based on analysis and usage
Nielsen Retail Index A.C. Nielsen Company Nielsen Plaza Northbrook, IL 60062 (312) 498-6300	Contains point-of-sale (POS) measurements of the effects on consumers of major marketing efforts and the flow of goods.	Monthly or every two months	Based on individual client request
Roper Reports The Roper Organization A subsidiary of Starch INRA Hooper, Inc. 205 East 42nd Street New York, NY 10017 (212) 559-0700	Contains information on attitudes and opinions of U.S. adults.	Ten times a year	Subscription, $21,000/year; connect-time charges based on information requested and analysis
Sales Prospector Prospector Research Service, Inc. 751 Main Street Waltham, MA 02154 (617) 899-1271	Identifies companies likely to acquire goods and services or hire employees based on corporate expansion or relocation.	Monthly	$15/monthly; subscribers to Sales Prospector, $24/hour; nonsubscribers, $60/hour
SAMI Selling Areas-Marketing, Inc. Time and Life Building Rockefeller Center New York, NY 10020 (212) 484-5800	Contains information on product movement and sales in the consumer-package-goods industry.	Monthly	Based on individual client request
VU/TEXT VU/TEXT Information Services, Inc. 1211 Chestnut Street Philadelphia, PA 19107 (215) 665-3300	Provides 17 newspapers and news-wire services on-line. Specializes in regional and business news.	Daily	$60—100/hour; depends on usage and information accessed
Western Union InFact Contact your local Western Union sales office	Gives access to more than 650 databases without making you learn the commands for each one and subscribe to each one individually.		Subscription for Western Union Easylink, $25/year; connect time, $9/hour; various search charges

table, many of these services aren't cheap. How can you relate their costs to their benefits?

First, consider what it would take for you to build an organization that could provide the service you are buying by accessing the database. With a database, you have a variable cost—you pay for it only when you use it. If you replicate the work yourself, on the other hand, you will incur the costs whether you use your database or not.

Also, you must take account of the time value of information—the more quickly you get it, the more it's worth. You won't be able to get information faster than in electronic form.

Don't use these arguments to go out and run up a $2000 bill for using on-line services, which, if you're not careful, is all too easy to do.

If success is any indication of the worth of on-line databases, no leading company in any industry today isn't using databases to help them gather information to make decisions.

According to David P. Norton, a former Harvard Business School professor and now president of Nolan, Norton & Co., a well-known consulting firm, if you don't make this "leap of faith" to managing information electronically, you will be, to put it bluntly, left eating the electronic dust of your competitors. ✚

Ken Landis has been a consultant since 1978. He has published more than 100 articles on the use of computers as business or personal tools.

SOME DATABASE PROVIDERS

Automatic Data Processing, Inc.
1 ADP Blvd.
Roseland, NJ 07068
(201) 994-5000

BRS Information Technologies
1200 Route 7
Latham, NY 12110
(800) 227-5277

CompuServe
CompuServe Information Service
5000 Arlington Center Blvd.
Columbus, OH 43220
(614) 457-8600

Control Data Corporation
8100 34th Avenue South
Box 0
Minneapolis, MN 55440
(612) 853-8100

Data Resources, Inc.
24 Hartwell Avenue
Lexington, Ma 02173
(617) 863-5100

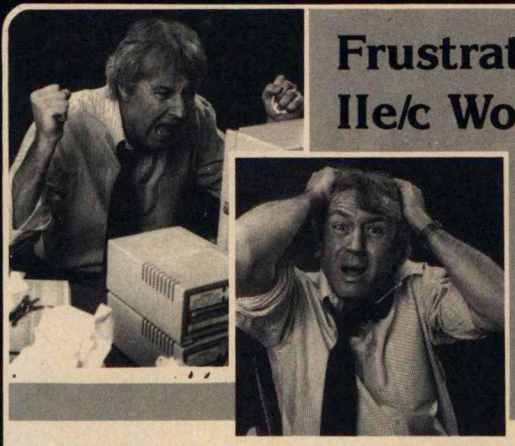
Dialog Information Services, Inc.
3640 Hillview Avenue
Palo Alto, CA 94304
(415) 858-2700

General Electric Information Services Company
401 North Washington Street
Rockville, MD 20850
(301) 340-4000

Interactive Marketing Systems
55 5th Avenue
New York, NY 10003
(212) 924-0200

NewsNet, Inc.
945 Haverford Road
Bryn Mawr, PA 19010
(215) 527-8030

The Source
Source Telecomputing Corporation
1616 Anderson Road
McLean, VA 22102
(800) 336-3366/(703) 734-7500



Frustrated With Your IIe/c Word Processor/ Speller?

Let the Bard's "Pro-Am" Writing System Calm you down!

With the Bard you get 3 Word Processing levels, a built-in 50,000 Spell Checker and Animated Graphic Tutorial.

. . . All for the tranquilizing price of only $69.95 *(Add $3.50 for postage & handling)*

If you're skeptical, read what some of our customers say about the Bard's "Pro-Am."

"I have never thanked a company for making a product before this time . . . Thank you for giving me an easy-to-use Apple Writing System for my whole family. The BARD is a winner++! I have never been able to get my wife to touch a word processor. Before the BARD, she found the world of word processing beyond her. Now she uses it (the Starter's level) several times a week (to write letters). Our daugher (the youngest) has gone through the tutorials and is our Experienced (level) user . . . in less than half an hour she was rolling.

Our sons have now switched (from AppleWorks to the BARD). The Spell Checker was instrumental in this decision. I am an article writer for magazines . . . and write every day. The BARD (Professional level) has made my work easier and fun again! One simply sits down and uses the BARD. A few checks here and there . . . the program rolls. I learned it in about a half hour and have been using it ever since. The speed of the editing and formatting keeps me moving . . . the "Quick" function macros let me keep a barrel of usable goodies a keystroke away. The simple use of different printer fonts unleashes the printer (this is the first program which included my Gemini 10x as a regular part of the program).

Thank you for living up to your advertising and the support you offer. Please consider me an automatic new customer for any of your new products. Just send them along." *(The Rev. Philip G. Houghton, Waynesburg, PA.)*

"I congratulate you and your staff for a marvelous program that everyone who owns an Apple (IIe/c) ought to have. *(Alex Golsalves, San Francisco)*

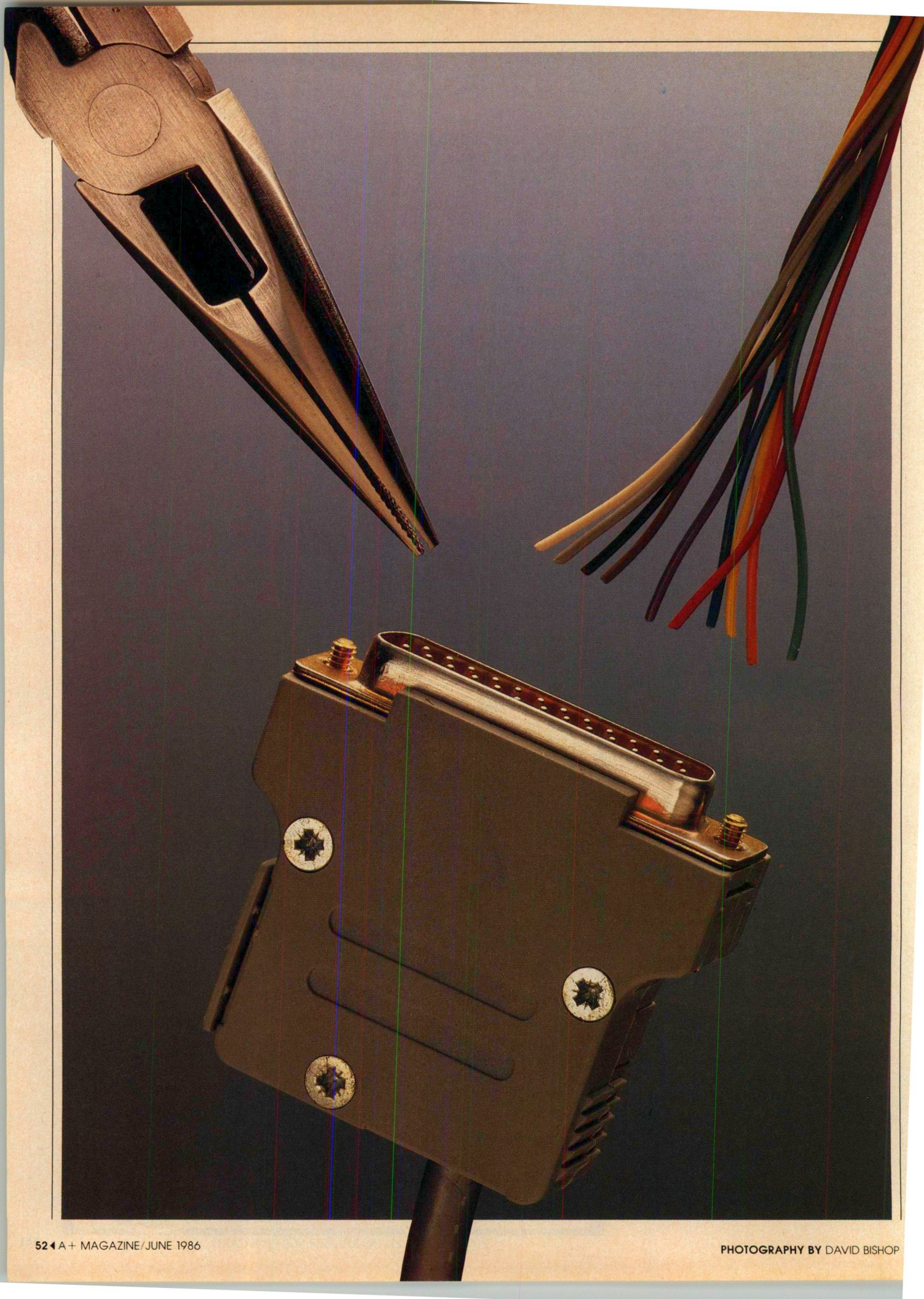
"The BARD Professional is absolutely the best small office word processor we have ever tried! The spellchecker is a terrific improvement over others I have had to teach our attorneys to use." *(Jackie Belker, Law Office Word Processing Trainer, Denver, CO)*

Bard features include: Preview full pages before printing • 30 Popular Printers Set-up Automatically • 50,000 Word Spell Checker built in • 40/80 Column Versions • Macros, Cut & Paste, Find & Replace • Destructive Overwrite • Illustrated Manual & much more.

90 DAY WARRANTY
When ordering, specify
ProDOS or 3.3 versions.
For Demo Disk send $5 plus .75 postage & handling.
Refundable with purchase.

Writing Software International
To order direct send $69.95 + $3.50 p.&h.
110 E. Broadway • Suite 600
Missoula, MT 59802
(406) 543-3141

CIRCLE 235 ON READER SERVICE CARD



PHOTOGRAPHY BY DAVID BISHOP

You can make

The Right Connections

Hook your Apple II or Mac to peripherals with cable connectors you make yourself.

After I'd finally sold the Macintosh Office System idea at work—to the tune of thousands of dollars—I cringed at the thought of having to cost-justify another purchase order of $40 per Macintosh for connector cables to wire them to our VAX. I mentioned my dilemma to an engineer who, within a matter of minutes, whipped up a connector cable by modifying a generic one he'd picked up at an electronic shop's close-out sale for 50¢.

After about a thousand questions, starting with "Why do they charge $40 for these things at computer stores?" I decided I had to learn how to make connector cables myself. Here are the results of that research—simple directions on how to make serial connector cables for the Apple II family, the Macintosh, and some Apple peripherals. I won't go into parallel cables, since they are extremely complex and shouldn't be attempted by novices.

Basically, all you need to do to build a cable is to look at the tables here or those in the SAMS books or *MicroMatch* (see "Selected Bibliography"). Find the connection you want to make, and then solder the connectors to the appropriate length of cable. We'll get to an actual example in a moment, but first, since Apple Computer has built some form of compatibility into all of its products in the form of the ubiquitous standard known as RS-232C, it won't hurt to learn a little more about that standard before you get out your soldering iron.

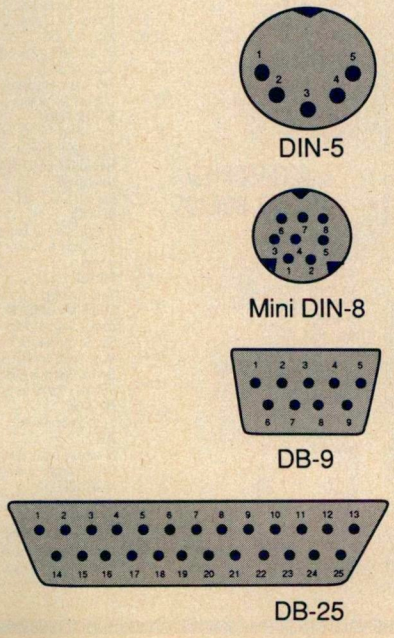


Figure 1: Apple uses the connectors shown to the left for its Apple II and Macintosh families of computers. The numbers are for the male pins and are reversed (left to right) for the female sockets.

The RS-232C

Recommended Standard (RS) number 232 of the Electronics Industries Association (EIA) has gone through three revisions: A, B, and the present standard—C, hence RS-232C. Although the entire standard covers a broad scope—everything from the number of pins to the amount of voltage—fortunately, you, as a cable constructor, don't need to know every nuance. All you need to know is *which* pin goes *where*, and you can find that information for most Apple products our accompanying charts.

I have also included a chart listing the EIA-standard RS-232C pin assignments, in case your owners' manual doesn't list your peripheral's pin assignments, but your peripheral may or may not conform. So if you are not connecting to an Apple peripheral, check the owners' manual for pin assignments. This information, along with our charts, should be enough information to let you deduce *what* needs to be soldered *where*.

The Hardware

DB-*n* describes certain connectors, where *n* is the number of pins for male, or sockets for female, in the connector. Apple has several different connectors besides the DB-25, a 25-pin connector that is commonly

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Elephant SS/DD ... 11.50
Elephant DS/DD ... 15.50
Verbatim SS/DD ... 12.00
Verbatim DS/DD ... 18.50
Memorex SS/DD ... 13.00
BASF SS/DD ... 9.99
Maxell SS/DD ... 13.00

CIRCLE 304 ON READER SERVICE CARD

YOUR PC WANTS YOU TO GIVE IT THE SAME ADVANTAGE YOU GIVE YOUR TAPE DECK AND VCR.

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In fact, TDK is the world's largest manufacturer of magnetic media.

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So, if you want to put a smile on your computer's face, choose from TDK's family of 5.25-inch standard, 5.25-inch High Density and 3.5-inch No-Risk™ Disks. It's to you and your PC's advantage.

TDK®

THE NO-RISK™ DISK.

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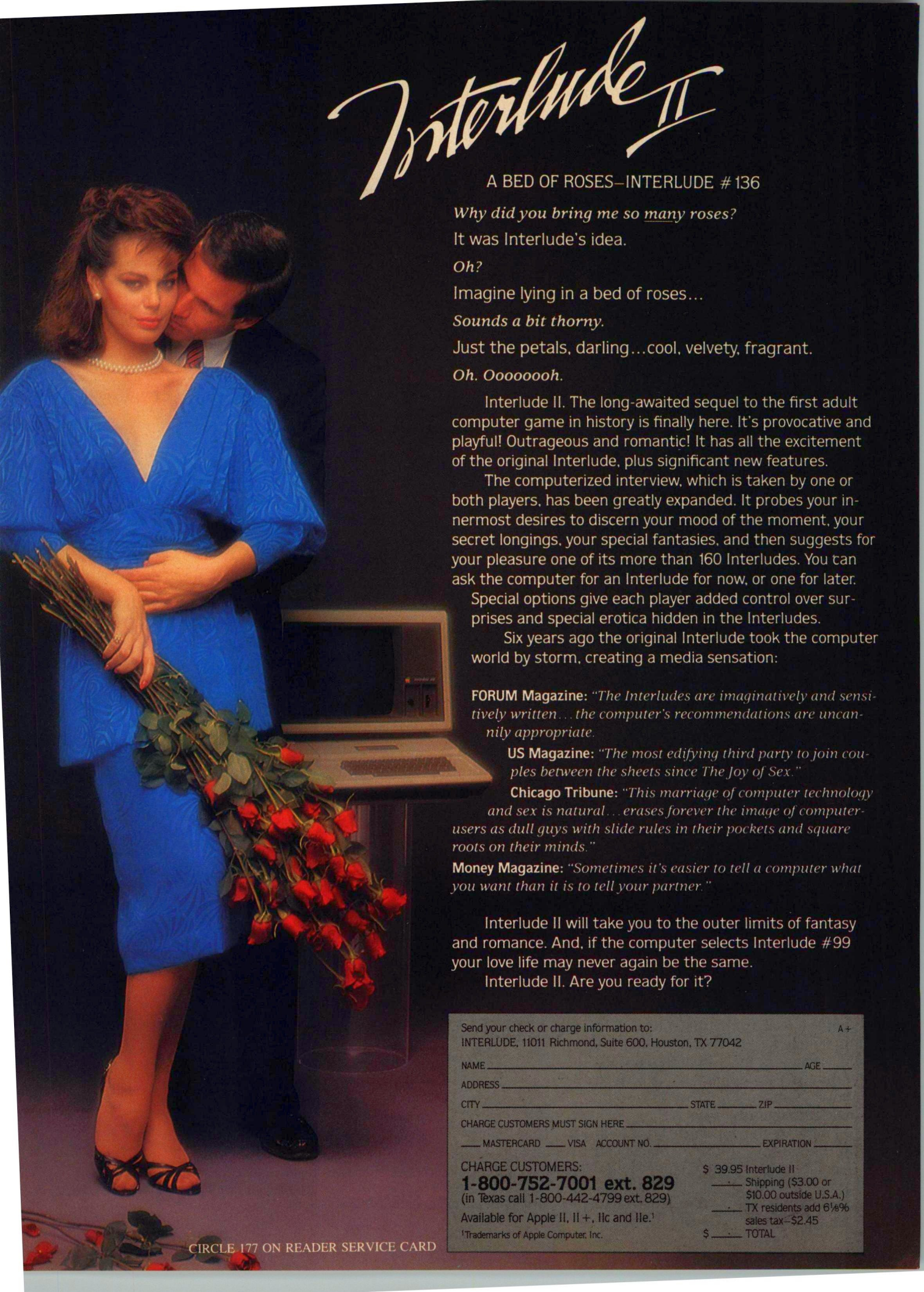
CIRCLE 169 ON READER SERVICE CARD


Interlude II
A BED OF ROSES–INTERLUDE #136
Why did you bring me so many roses?
It was Interlude's idea.
Oh?
Imagine lying in a bed of roses...
Sounds a bit thorny.
Just the petals, darling...cool, velvety, fragrant.
Oh. Oooooooh.
Interlude II. The long-awaited sequel to the first adult computer game in history is finally here. It's provocative and playful! Outrageous and romantic! It has all the excitement of the original Interlude, plus significant new features.
The computerized interview, which is taken by one or both players, has been greatly expanded. It probes your innermost desires to discern your mood of the moment, your secret longings, your special fantasies, and then suggests for your pleasure one of its more than 160 Interludes. You can ask the computer for an Interlude for now, or one for later.
Special options give each player added control over surprises and special erotica hidden in the Interludes.
Six years ago the original Interlude took the computer world by storm, creating a media sensation:
FORUM Magazine: *"The Interludes are imaginatively and sensitively written... the computer's recommendations are uncannily appropriate.*
US Magazine: *"The most edifying third party to join couples between the sheets since The Joy of Sex."*
Chicago Tribune: *"This marriage of computer technology and sex is natural... erases forever the image of computer-users as dull guys with slide rules in their pockets and square roots on their minds."*
Money Magazine: *"Sometimes it's easier to tell a computer what you want than it is to tell your partner."*
Interlude II will take you to the outer limits of fantasy and romance. And, if the computer selects Interlude #99 your love life may never again be the same.
Interlude II. Are you ready for it?
Send your check or charge information to:
INTERLUDE, 11011 Richmond, Suite 600, Houston, TX 77042
A+
NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
CHARGE CUSTOMERS MUST SIGN HERE _____
___ MASTERCARD ___ VISA ACCOUNT NO. _____ EXPIRATION _____
CHARGE CUSTOMERS:
1-800-752-7001 ext. 829
(in Texas call 1-800-442-4799 ext. 829)
Available for Apple II, II+, IIc and IIe.[1]
[1]Trademarks of Apple Computer, Inc.
$ 39.95 Interlude II
___ Shipping ($3.00 or $10.00 outside U.S.A.)
___ TX residents add 6⅛% sales tax–$2.45
$ ___ TOTAL
CIRCLE 177 ON READER SERVICE CARD

used on interface cards for Apple II, II Plus, and IIe computers for the RS-232C. The modem and printer ports on the back of the Macintosh are both RS-422 (another EIA standard—faster and useful for longer-length cables—which Apple has made quite compatible with RS-232C) DB-9 connectors (see figure 1). The Macintosh Plus also uses the RS-422 but has a new Mini DIN 8 connector. The Apple IIc uses a 5-pin DIN connector with nonstandard DIN labels for both of its serial ports (see figure 1). Most connectors have the numbers of the pins printed near the pin or socket, or you can refer to figure 1 to see the numbers for the male connector. All of Apple's connectors, with their pin assignments, appear in the accompanying charts.

A Typical Scenario

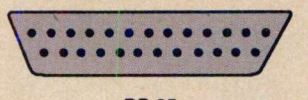
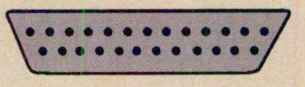
I fear all this is sounding too complex. Let me show you how I recently made a connector cable for connecting a Macintosh to an Apple IIe so I could transfer data with Southeastern Software's MacTransfer. Note, the cable I'm about to describe can also serve as an ImageWriter connector cable. This type of cable is known as a null-modem cable or a modem eliminator. (See "Flip a DIP Switch" in last month's issue for a full explanation of modem eliminators. Basically, a modem eliminator enables two DTEs [terminals or printers] to talk directly rather than through two DCEs [modems] by switching the wires on the number 2 and number 3 pins on one end of the cable).

Normally a cable connecting two computers requires the Super Serial Card's (SSC) jumper block to point toward TERMINAL. I wanted to keep my SSC jumper block pointed toward MODEM, though, whether I was using my modem or my custom cable to connect my two computers. So I needed to construct a modem-eliminator cable for the connection.

All I needed to do was design a cable that connected the female DB-9 on the back of the Macintosh with the female DB-25 on the back of the IIe, coming from a Super Serial Card within the computer, as described above. Obviously, I needed some male connectors.

I remembered an article I'd read in the Berkeley, California, Macintosh Users Group's (BMUG) newsletter, saying you could cut and modify a joystick extension cable (20 feet of

The Apple Cable

COMPUTER	PERIPHERAL
II, II+, IIe with Super Serial Card  DB-25	ImageWriter
	ImageWriter II
	LaserWriter
	Daisy Wheel Printer
	Scribe Printer
	Modem 300/1200
	Personal Modem
	Color Plotter
	Macintosh
IIc DIN-5	ImageWriter
	ImageWriter II
	Scribe Printer
	Daisy Wheel Printer
	Modem 300/1200
	Personal Modem
	Color Plotter
III with Super Card III  DB-25	ImageWriter (4)
	ImageWriter II
	Scribe (4)
	Daisy Wheel Printer (4)
	Modem 300/1200
	Personal Modem
	Color Plotter

Note: All cables should have shield-to-shield connections.
Most of the information in this chart was obtained on AppleLink, an on-line service provided by Apple to authorized Apple dealers.

Connection

PIN CONFIGURATION The first number is for the computer's connector. The second number is for the peripheral's connector.							NOTES	CABLE NUMBER
1–1	13–13	19–19	23–23				(1)	590-0037
1–20	2–8	3–2	4–7	5–3	8–7		(1) on DB-25:jump 8–6	590-0335
1–1	2–2	3–3	7–7				(1) (2)	custom
1–1	13–13	19–19	23–23				(1)	590-0037
Match identical pin numbers							(1)	590-0121
6–2	7–3	3–5	20–6	8–7	1–8	2–9	(3) on DB-25: jump 8–5	590-0212
8–1	20–2	3–3	7–4	2–5	7–8		(3) on DB-25: jump 8–6	590-0331
1–1	13–13	19–19	23–23				(1)	590-0037
1–1	3–7	5–3	7–20	9–2			(3)	590-0169
1–6	2–3	3–7	4–2	5–20				590-0191
1–1	5–2	2–3	3–4	4–5	3–8			590-0333
1–6	2–3	3–7	4–2	5–20				590-0191
1–6	2–3	3–7	4–2	5–20				590-0191
1–6	2–9	3–3	4–5	5–2			on DB-9: jump 3–8	590-0192
1–1	5–2	2–3	3–4	4–5	3–8			590-0333
1–6	2–3	3–7	4–2	5–20				590-0191
1–1	13–13	19–19	23–23					590-0037
8–1	20–2	3–3	7–4	2–5	7–8		on DB-25: jump 8–6	590-0331
1–1	13–13	19–19	23–23					590-0037
1–1	13–13	19–19	23–23					590-0037
6–2	7–3	3–5	20–6	8–7	1–8	2–9	on DB-25: jump 8–5	590-0121
8–1	20–2	3–3	7–4	2–5	7–8		on DB-25: jump 8–6	590-0331
1–1	13–13	19–19	23–23					590-0037

(1) On Super Serial Card (SSC) rotate jumper block toward TERMINAL.
(2) On SSC: SW1—4, 6, 7 on; SW2—1, 4 on. Requires Xon/Xoff handshaking.
(3) On Super Serial Card (SSC) rotate jumper block toward MODEM.
(4) Also needs modem-eliminator cable (see Special Cables).

cord connecting a male and a female DB-9). At press time, these cost $5.37 at K-Mart. These extensions are also available from Radio Shack. I figured just the 20 feet of cable (normally 20¢ to 40¢ per foot) made the $5.37 a bargain. Unfortunately, if you go this route, the connector's molding is closed, so you can't see which wire connects to which pin (the wires' color coding normally shows you). Consequently, you will have to test each wire (with a continuity tester or a battery and a light bulb) to see which wire comes from which pin on the DB-9 connector.

If you want to buy a DB-9 that is not molded closed, most electronics stores, including Radio Shack, carry them. They also have the DB-25s and the DIN-5 for the IIc. Be sure to buy the hoods for these connectors, as they usually come separately and are a *must* for safety's sake.

My engineer acquaintance who bought the cable for 50¢ had a prefabricated DB-25-to-DB-9, male-to-male connector cable. Since the pin assignments were wrong, he used a pin extractor (available at computer-supply stores for around $4), which looks a lot like a miniature nail punch, to punch out the pins and reinsert them in their proper holes. If you use a pin extractor, be sure to buy some extra pins; they break easily. Cut off any pins you don't need for the connection and tape them with electrician's tape where the main insulation is stripped back.

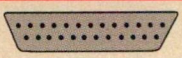
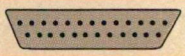
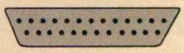
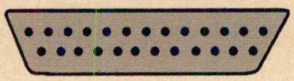
Anyway, I went to K-Mart, bought the joystick extension cable, and then stopped at a Dick Smith's Electronics store (these Australian equivalents of Radio Shacks are sprouting like Eucalyptus trees all over California) and got a male DB-25 with a hood. When I got home, I cut off the female end of the joystick extension cable, along with 18 feet of cable, which left two feet of cable on the male end of the cable—my Apples like to snuggle up close.

Since I don't own a continuity tester, I rigged one up by taping a battery to one of the leads of a battery tester, hooking a wire onto the other end of the battery, and then used the other lead and the wire's end to find out which wire came from which prong on the extension cable. I used this information to make a color chart categorizing each

Continued on page 64

The Apple Cable Connection

Continued

COMPUTER	PERIPHERAL
Mac DB-9	**ImageWriter** 
	ImageWriter II
	Modem 300/1200
	Personal Modem
	non-Apple modem
	Apple IIe 
Mac Plus Mini DIN-8	**ImageWriter** (5) 
	ImageWriter II
	Modem 300/1200 (6)
	Personal Modem
	Hayes Smart modem
Mac XL  DB-25	**ImageWriter** (4)
	ImageWriter II
	Daisy Wheel Printer
	Modem 300/1200
	Personal Modem
Special Cables	**Modem eliminator**
	Mini DIN-8 to DB-9 (7)
	SCSI System cable
	SCSI cable terminator
	SCSI cable extender
	SCSI peripheral interface

Note: All cables should have shield-to-shield connections.

Most of the information in this chart was obtained on AppleLink, an on-line service provided by Apple to authorized Apple dealers.

PIN CONFIGURATION The first number is for the computer's connector. The second number is for the peripheral's connector.							NOTES	CABLE NUMBER
1–1	3–7	5–3	7–20	9–2				590-0169
1–7	2–6	3–9	4–1	5–5	6–8	7–7	8–4	590-0332
3–3	5–9	6–6	7–7	8–8	9–5		on both ends: jump 3–8	590-0197
1–7	2–6	3–9	4–1	5–5	6–8	7–7	8–4	590-0332
1–1	3–7	5–2	7–20	9–3			on DB-9: jump 3–8	custom
See Apple IIe to Macintosh above								custom
2–20	3–3	4–1	5–2	8–7				custom
1–2	2–1	3–5	4–4	5–3	6–8	7–7	8–6	590-0340
1–6	2–7	3–9	4–3&8	5–5	8–7			custom
1–2	2–1	3–5	4–4	5–3	6–8	7–7	8–6	590-0340
1–20	4–7	3–2	2–5	5–3				custom
1–1	13–13	19–19	23–23					590-0037
8–1	20–2	3–3	7–4	2–5	7–8		on DB-25: jump 8–6	590-0331
1–1	13–13	19–19	23–23					590-0037
6–2	7–3	3–5	20–6	8–7	1–8	2–9	on DB-25: jump 8–5	590-0121
8–1	20–2	3–3	7–4	2–5	7–8		on DB-25: jump 8–6	590-0331
1–1	2–3	3–2	4&5–8	6–20	7–7	8–4&5	20–6	590-0166
1–6	2–7	3–5	4–3	5–9	6–4	8–8	on DB-9: jump 1–3	590-0341
Refer to reference materials supplied with Apple cables								590-0345
Refer to reference materials supplied with Apple cables								590-0348
Refer to reference materials supplied with Apple cables								590-0347
Refer to reference materials supplied with Apple cables								590-0346

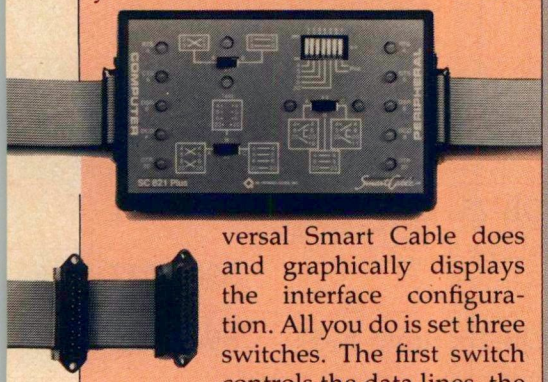
(5) Or use DIN-8 adapter (590-0341) and Macintosh ImageWriter cable (590-0169).
(6) Or use DIN-8 adapter (590-0341) and Macintosh Modem cable (590-0197).
(7) An adapter for converting the DB-9 connector on a Macintosh to a Mini DIN-8 connector for use with the ImageWriter II or Personal Modem.

Smart Cables

Maybe you have borrowed a friend's printer and have forgotten the cable. You don't have a reference manual for it, so you cannot easily construct one. So you pull out your box of tangled cables and, through trial and error, finally find a cable that works. There is an easier way.

IQ Technologies manufactures a complete line of "smart" RS-232 interface cables. The basic Universal Smart Cable automatically looks at both serial interfaces and configures itself to correctly connect the data, control, and handshake lines. That's right, you can use a single cable with your serial printer, a modem, and your friend's printer—or any other RS-232 devices—and you never have to pull out the soldering iron.

If you don't just want to get your peripheral working but also want to construct a custom cable, you'll be interested in IQ Technologies' Smart Cablemaker. It instantly connects your two RS-232 devices like the Universal Smart Cable does and graphically displays the interface configuration. All you do is set three switches. The first switch controls the data lines, the second configures the control lines, and the third sets the correct handshaking protocol.



Universal Smart Cable, Smart Cablemaker, and **Apple IIc Smart Cable**
IQ Technologies, Inc.
11811 NE First Street
Bellevue, WA 98005/(206) 451 0232
Distributed by IAM
P.O. Box 2545
Fair Oaks, CA 95628/(916) 961-8082
List Price: Universal Smart Cable (SC821), $49.95; Smart Cablemaker (SC821Plus), $149.95; Apple IIc Smart Cable (SC809), $39.95
Require: Universal Smart Cable and Smart Cablemaker require any RS-232 device with DB-25 connectors; Apple IIc Smart Cable requires Apple IIc

CIRCLE 375 ON READER SERVICE CARD

Pin Assignments

These tables show the signal names and pin assignments of common Apple serial connectors.

EIA STANDARD

RS-232C

PIN	SIGNAL NAME
1	Protective Ground
2	Transmitted Data (TXD)
3	Received Data (RXD)
4	Request to Send (RTS)
5	Clear to Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground (GND)
8	Received Line Detector
9	Reserved for Data Testing
10	Reserved for Data Testing
11	Unassigned
12	Secondary Received Line Signal Detector
13	Secondary Clear to Send
14	Secondary Transmitted Data
15	Transmission Signal Element Timing (DCE Source)
16	Secondary Received Data
17	Receiver Signal Element Timing
18	Unassigned
19	Secondary Request to Send (SCTS)
20	Data Terminal Ready (DTR)
21	Signal Quality Detector
22	Ring Indicator
23	Data Signal Rate Selector
24	Transmit Signal Element Timing
25	Unassigned

COMPUTERS

Apple II, II+, IIe Super Serial Card (SSC)

PIN	SIGNAL NAME
1	Frame Ground
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Request to Send (RTS)
5	Clear to Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground (GND)
8	Data Carrier Detect (DCD)
19	Secondary Clear to Send (SCTS)
20	Data Terminal Ready (DTR)

Apple IIc Printer and Modem Serial Ports

PIN	SIGNAL NAME
1	Data Terminal Ready (DTR)
2	Transmit Date (TXD)
3	Ground (GND)
4	Receive Data (RXD)
5	Data Set Ready (DSR)

Macintosh Printer and Modem Serial Ports

PIN	RS-422 SIGNAL NAME
1	Frame Ground
2	+5v*
3	Signal Ground (GND)
4	Transmit Data (TXD+)
5	Transmit Data (TXD–)
6	+12v*
7	Handshake
8	Receive Data (RXD+)
9	Receive Data (RXD–)

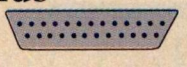
*Apple provides power in pins 6 and 2 for reference purposes only; the company recommends that you *not* use this voltage to power external devices.

BY CHIP CARMAN

Macintosh Plus Printer and Modem Serial Ports

PIN	RS-422 SIGNAL NAME
1	Handshake, Output (HSKo +12v)
2	Handshake, Input (HSKi)
3	Transmit Data (TXD–)
4	Frame Ground (GND)
5	Receive Data (RXD–)
6	Transmit Data (TXD+)
7	Not connected
8	Receive Data (RXD+)

Macintosh Plus SCSI Port



PIN	SIGNAL NAME
1	Request (REQ–)
2	Message (MSG–)
3	I/O–
4	Reset (RST–)
5	Acknowledge (ACK–)
6	Busy (BSY–)
7	Ground (GND)
8	Data Line 0 (DB0–)
9	Ground (GND)
10	Data Line 3 (DB3–)
11	Data Line 5 (DB5–)
12	Data Line 6 (DB6–)
13	Data Line 7 (DB7–)
14	Ground (GND)
15	Carrier Detect (C/D–)
16	Ground (GND)
17	Attention (ATN–)
18	Ground (GND)
19	Select (SEL–)
20	Parity (DBP–)
21	Data Line (DB1–)
22	Data Line (DB2–)
23	Data Line (DB4–)
24	Ground (GND)
25	Not connected

NOTE:
The minus sign indicates that the signal voltage levels are negative. The SCSI port uses –5v logic levels.

WARNING: Because the SCSI port is a DB-25, it looks like an RS-232 port. *Do not* plug an RS-232 device into the SCSI port. Special precaution is necessary when considering a SCSI device for the SCSI port. Check with the SCSI-device manufacturer to make sure the device is not expecting termination power from the Macintosh Plus.

MODEMS

Modem 300/1200

PIN	SIGNAL NAME
1	Not connected
2	Data Set Ready (DSR)
3	Signal Ground (GND)
4	Not connected
5	Receive Data (RXD)
6	Data Terminal Ready (DTR)
7	Data Carrier Detect (DCD)
8	Frame Ground (GND)
9	Transmit Data (TXD)

Personal Modem

PIN	SIGNAL NAME
1	Data Set Ready (DSR)
2	Data Terminal Ready (DTR)
3	Receive Data (RXD)
4	Signal Ground (GND)
5	Transmit Data (TXD)
6	Signal Ground (GND)
7	Data Carrier Detect (DCD)
8	Not connected

PRINTERS

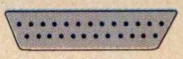
LaserWriter

PIN	SIGNAL NAME
1	Ground (GND)
3	Ground (GND)
4	Transmit Data, Plus (TXD+)
5	Transmit Data, Minus (TXD–)
8	Receive Data, Plus (RXD+)
9	Receive Data, Minus (RXD–)

LaserWriter

PIN	SIGNAL NAME
1	Frame Ground (GND)
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Ready to Send (RTS)
7	Signal Ground (GND)
20	Data Terminal Ready (DTR)

ImageWriter

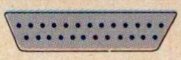


PIN	SIGNAL NAME
1	Frame Ground
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Request to Send (RTS)
7	Signal Ground (GND)
14	Fault
20	Data Terminal Ready (DTR)

ImageWriter II

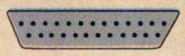
PIN	RS-422 SIGNAL NAME
1	Data Terminal Ready (DTR)
2	Data Set Ready (DSR)
3	Transmit Data Minus (TxD–)
4	Signal Ground (GND)
5	Receive Data Minus (RxD–)
6	Transmit Data Plus (TxD+)
7	Not connected
8	Receive Data Plus (RxD+)

Apple Daisy Wheel Printer (DWP)



PIN	SIGNAL NAME
1	Frame Ground
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Request to Send (RTS)
5	Clear to Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground (GND)
8	Data Carrier Detect (DCD)
20	Data Terminal Ready (DTR)

Apple Scribe Printer



PIN	SIGNAL NAME
1	Frame Ground
2	Transmit Data (TXD)
3	Receive Data (RXD)
4	Request to Send (RTS)
7	Signal Ground (GND)
20	Data Terminal Ready (DTR)

wire by color and DB-9 pin number. Then I checked the Apple Cable Chart for the Apple IIe-to-Macintosh pin configuration to find where the wires from the DB-25 should be soldered on the DB-9.

You will need a small vice or clamp to hold any of the connectors during soldering, because you will need to have both hands free. Write down the color of the wires next to the pin number on the chart you are following.

Start by cutting off about an inch of the main insulation from the main cable to expose the small wires inside. Strip the wires for soldering, but not too far. The metal shouldn't protrude beyond the end of the sheath it is to fit into (the one on the top of the pin—see figure 2). Heat the sheath, touch the solder to it, and then heat the wire as you press it against the sheath. Heating the component, rather than the solder, draws the solder into the component.

Cut back any wires you aren't going to use to where you have stripped away the outer main coat of insulation—in the above example, that's the wires from pins 2, 4, and 6 on the DB-9. If solder or bare wire touches, or can touch, any other metal components, you must resolder that wire—excess metal or solder is an invitation to a short circuit.

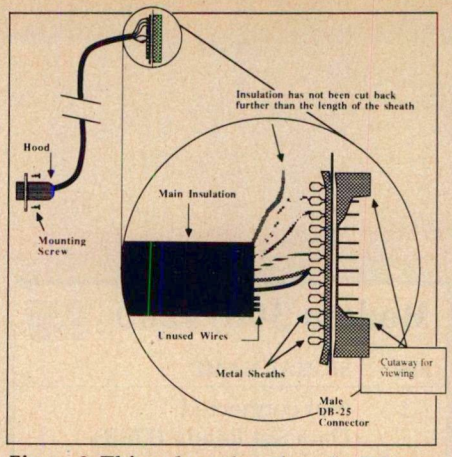


Figure 2: This enlarged section of a DB-25 connector shows proper connections for a null-modem cable as described in the text. Notice how the insulation on the small wires has not been cut back beyond the sheath. Also note how the unused wires have been cut back to where the main insulation was stripped away.

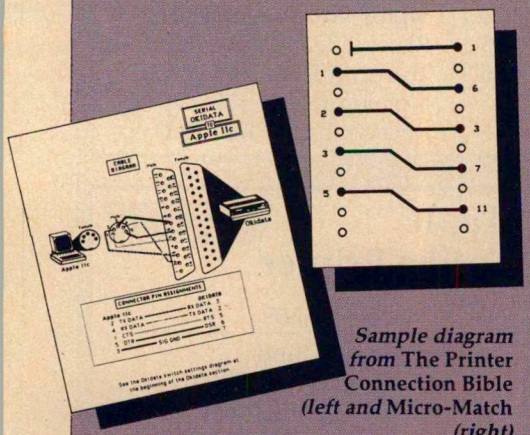
Check Your Work

After I finished soldering, I used my "continuity meter" to check my work, to be sure the correct pins were connected to each other. Then I clipped back the unused wires 2, 4, and 6 from the DB-9 and installed the hood on the DB-25. I checked again for correct connections and hooked the cable up to watch the magic: Apple Writer II files appearing on the Macintosh screen. In the microelectronic world of complex circuits and incredibly tiny devices inside your computer, it's nice to know there are still some things you can do yourself—with your own two hands. ✚

Brian Cutter is a writer who writes users' guides for VAX mainframe-class financial software during the day, Apple articles in the early evening, MAUG missives at night, and Pascal poetry in the wee hours.

Selected Bibliography

Our focus here is providing cable-construction solutions for Apple products, but because many other manufacturers also make peripherals, we are supplying additional sources of information we think are useful.



Sample diagram from* The Printer Connection Bible *(left and* Micro-Match *(right)

Printer Connections Bible
House, Kim G., and Jeff Marble
Howard W. Sams & Co., Inc.
4300 West 62nd Street
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Curtis, Carolyn, and Daniel L. Majhor
Howard W. Sams & Co., Inc.
4300 West 62nd Street
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Programmers' Handbook of Computer Printer Commands (For printer models through 1984)
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Getting the Most Out of Your Epson Printer
Kater, David A., and Richard L. Kater
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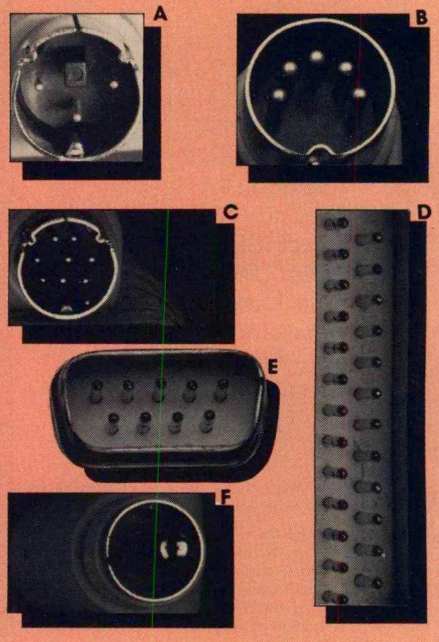
Minute Manual for the Dot Matrix Printer
Pirisino, Jim
MinuteWare
P.O. Box 2392
Columbia, MD 21045

MicroMatch
Command Computer Corporation
36 Columbia Terrace
Weehawken, NJ 07087

The Apple Interface Manual
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014

Test Your Cable I.Q.

Now that you know how to make the right connections, can you recognize the six types of Apple cable connectors and the products on which you find them? See answers on page 152.



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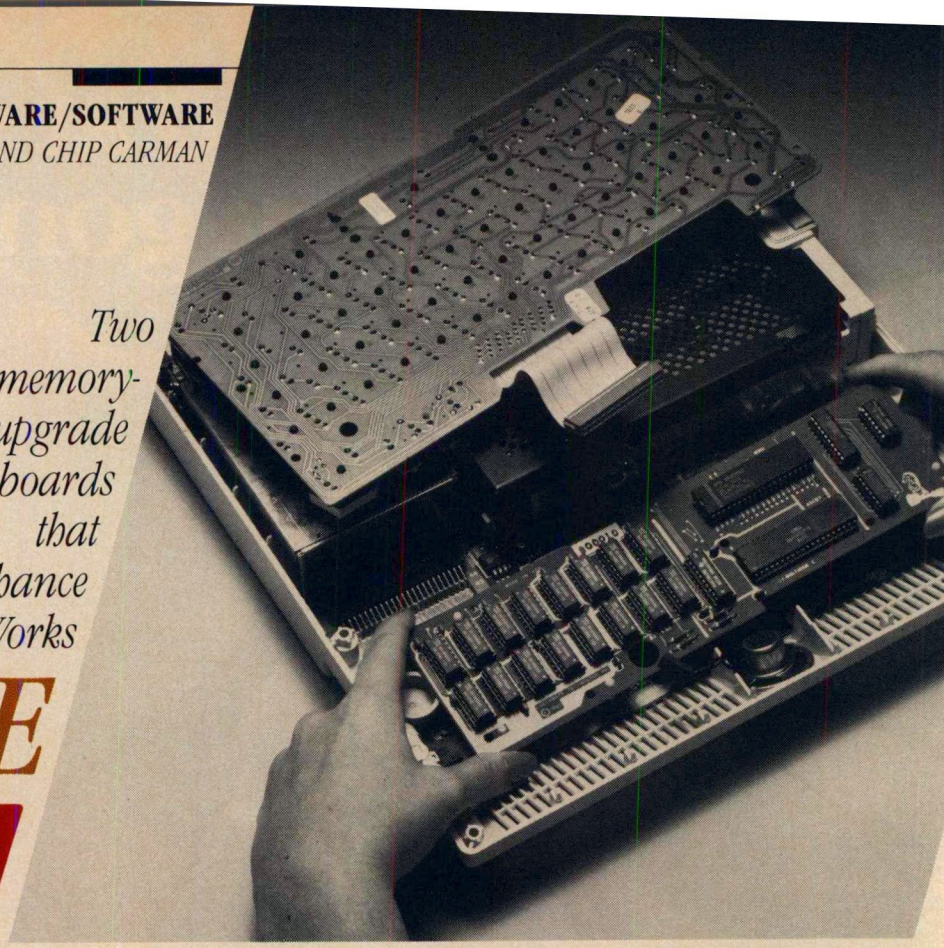
HARDWARE/SOFTWARE

BY JOHN F. CLEARY AND CHIP CARMAN



Two memory-upgrade boards that enhance AppleWorks

THE EXPAN

The popular Apple IIc and AppleWorks provide a compact and powerful processing package, but they've been missing one important ingredient, the ability to use extra memory—until recently, that is. Checkmate Technology, Inc., and Applied Engineering now offer memory-upgrade boards that you can install inside your Apple IIc.

These boards let you expand the Apple IIc memory from 128K to a maximum 640K (512K upgrade + 128K in your IIc = 640K), and the packages include software utilities that modify AppleWorks to recognize the extra memory (allowing the desktop to expand from 55K to 425K) or let you set up a RAMdisk. (A RAMdisk is an area of memory that emulates a disk drive. It is faster than a disk drive but is impermanent—when you turn the computer off, you lose everything on the RAMdisk.) If you decide to use the extra memory for a RAMdisk, you'll be able to use AppleWorks without a second disk drive, which will make the IIc more convenient and portable.

A Note of Warning

The IIc warranty and Apple's extended-warranty service agreement, Applecare, are voided if anyone other than an authorized service technician opens the casing. Even if an authorized technician installs one of these memory boards, Apple voids the contract if a resultant problem relates to the board. Apple is testing these products and will likely soon conclude that installation does not, in fact, void the contract.

Now let's take a close look at these two boards.

MULTIRAM CX

A physical examination of the MultiRam CX board is worthwhile before you install it in the computer. You'll see that all the chips are socketed, so you can remove and replace them if they fail individually. The board is wave-soldered, which means it's not very susceptible to failure due to poor or broken connections if you flex or bend it during installation. All in all, it looks like a well-built piece of hardware and comes with a five-year, transferable warranty.

Installation

We recommend having your dealer install the board. Although the manual is fairly comprehensive, it does take certain technical knowledge for granted. Should you decide to do the installation yourself, the most difficult task you'll have is opening the IIc.

After the board is installed, you should run the diagnostic test on the utility disk (see figure 1). Assuming the board tests out OK, the next step is to get AppleWorks running with the board.

AppleWorks Patch

The utility disk contains an AppleWorks patch that updates AppleWorks to recognize the new memory on the board and expand certain portions of the program. Using the patch is a one-time operation; once you've done it,

PHOTOGRAPHY BY PACIFIC HORIZONS

you won't have to reconfigure the disks, even if you later add more memory to the board.

The 512K MultiRam CX, with AppleWorks version 1.2, allows a maximum of 5350 records in the database, instead of the original 1350. The word-processing program is still limited to 2250 lines (although there are changes here too), and the clipboard capacity is the same at 255 lines. This version of AppleWorks, like unmodified AppleWorks, can work with the Jeeves and Pinpoint desktop-accessory programs (for more information see "Pinpoint vs. Jeeves," *A+*, April 1986, pages 70–77).

With the extra memory, AppleWorks' spreadsheet can contain up to 127,873 cells; in contrast, a 128K IIc lets you fill only 6000 cells. Our calculations indicate that you should be able to fill between 16,000 and 17,000 cells, depending on the complexity of the formulas.

The program you use to reconfigure the AppleWorks start-up and program disks guides you through each step of the reconfiguration process. Just do what the computer asks you to do, and in five minutes you will have new start-up and program disks.

The Expanded AppleWorks

Starting the reconfigured AppleWorks is the same as starting the unmodified version, with one exception. Before you see the main menu, the program asks you how much of the AppleWorks system you want loaded into memory. Loading all of the AppleWorks programs into the computer's memory can take as long as two minutes. If you choose to have the computer load only the original incarnation of AppleWorks, it takes only about 25 seconds.

Loading the entire program into memory makes AppleWorks operate very quickly, because the program never has to access the disk drive—thus slowing down—except when you print a document.

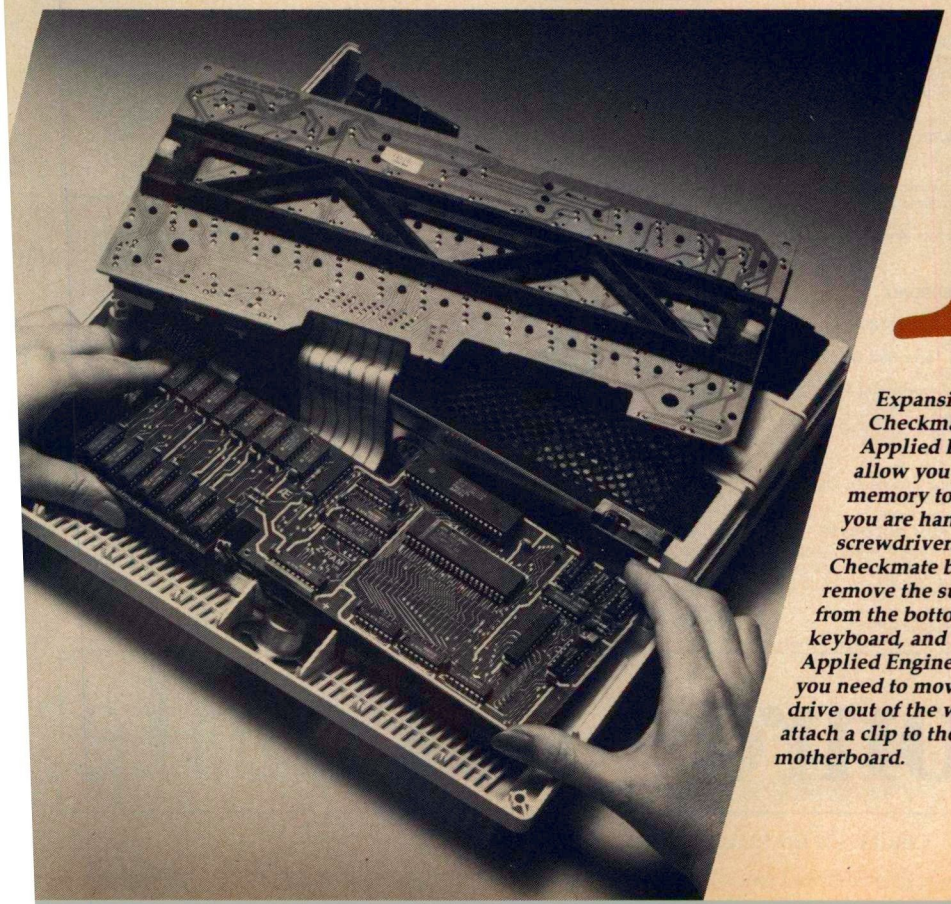
Checkmate doesn't include a print buffer with this product, so you must wait whenever documents are printing. Since large files are now possible, a print buffer is a useful and time-saving addition to a system such as this one.

The additional memory on the desktop comes in especially handy for word processing in AppleWorks. The word-processing program allows a maximum of 2250 lines, but with the small, 55K desktop, you can use only about 1150 lines. With the expanded desktop, however, you can use all 2250 lines, which allows you to combine two small word-processing files into one large file. If your word-processing file becomes larger than 136K, the maximum amount of data that you can save on a typical AppleWorks data disk, MultiRam's modification to AppleWorks lets it automatically divide the file into parts and save them on a series of disks. This segmentation activates only when AppleWorks detects that it has run out of room on a disk but still has part of a file left to save.

RAMdisk

Besides using MultiRam with AppleWorks, you can create a RAMdisk. You can copy any application

DABLE IIc



Expansion boards from Checkmate (above) and Applied Engineering (left) allow you to add more memory to the Apple IIc if you are handy with a screwdriver. To install the Checkmate board, you must remove the support bar from the bottom of the keyboard, and to install the Applied Engineering board, you need to move the disk drive out of the way to attach a clip to the motherboard.

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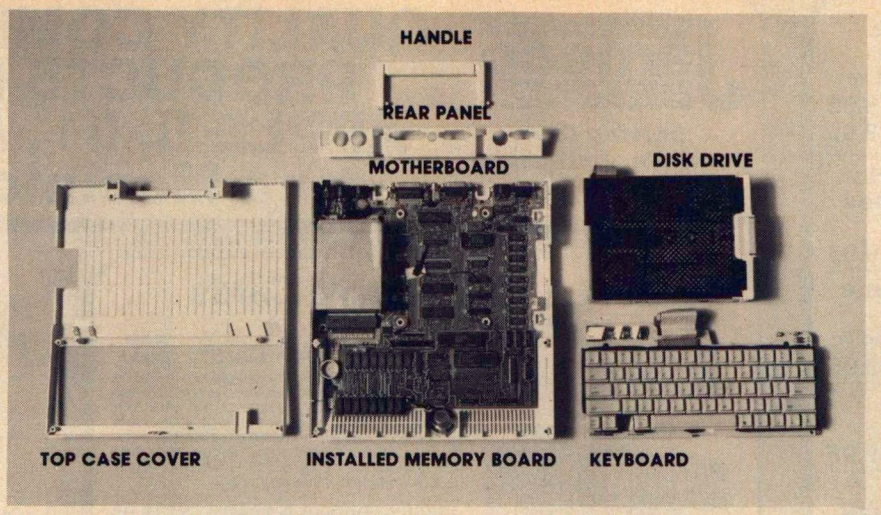
CIRCLE 129 ON READER SERVICE CARD

program to the RAMdisk and use the Apple IIc internal disk drive for data disks, eliminating the need for an external second disk drive. For this article, we will go into detail only about the ProDOS RAMdisks, but MultiRam also allows you to create RAMdisks for DOS 3.3 and Pascal. ProDOS itself automatically sets up a 64K RAMdisk that is named /RAM in slot 3, drive 1. In addition, one of MultiRam's utility programs allows you to partition the remaining memory between programming space and an additional RAMdisk. This additional RAMdisk, known as /MRAM, automatically sets itself for use in slot 3, drive 2.



The exposed Apple IIc, showing the major components of the computer

In order to use any programs or files on the RAMdisk, you must direct the computer to copy programs or files onto it. Checkmate has included Apple's ProDOS copy program called Filer (Version 1.1), which can copy files from one pathname to another. This version of filer does not automatically copy files in subdirectories, so you might want to use the Copy program on the Apple IIc System Utilities disk that comes with the Apple IIc, which does automatically copy them.

Copying Files to a RAMdisk

If you are a ProDOS novice, you may find these tips on copying all the files from a floppy disk to the RAMdisk with Filer handy. After you've created your RAMdisk, MultiRam's program lets you run Filer. With Filer's main menu on the screen, remove the MultiRam utility disk and insert the disk you want to copy into the disk drive. From the Filer menu, choose Volume Commands and then List Volumes to find the name of your disk. You'll see /RAM, /MRAM, and the name of the disk from which you want to copy. Pressing the Escape key twice takes you back to the main menu.

This time, choose File Commands and then Copy Files. To copy all the files on your disk to MultiRam's RAMdisk, use the = symbol, which means "all files." For example, when you're in the Copy Files section of Filer's Copy program, you'll see

```
-COPY-
   PATHNAME:(
TO PATHNAME:(
```

After PATHNAME:(, type your disk's name, preceded by a slash (/) and followed by a slash and an equals sign (/=). After TO PATHNAME:(, you should type (/MRAM/= without any spaces. For further details on using pathnames and ProDOS, refer to the manuals that came with your IIc system or see the *A+* "Understanding ProDOS" series in the May–September 1985 issues.

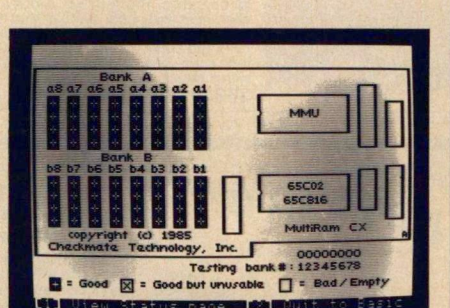


Figure 1: Checkmate's easy-to-use diagnostic program clearly indicates which memory chips are good.

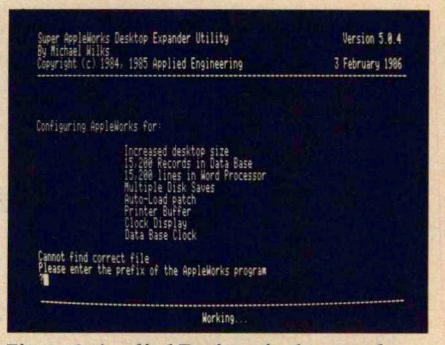


Figure 2: Applied Engineering's expander utility shows the new features that the board will add to AppleWorks.

If you still find pathnames exasperating, consider using MouseDesk or Catalyst 3.0 (see the cover story of our March issue, "Exploring the Apple II Desktop"). These programs create a Macintosh-like interface on your IIc and use icons to represent the diskettes and files. You can run either of these programs to create a desktop and then run your application, such as AppleWorks, by double-clicking on its icon. Instead of having to know what pathname to type in when you quit AppleWorks, you can run other application programs by double-clicking on their icons when the Mac-like desktop reappears.

With MouseDesk, you can easily move files to the RAMdisk by moving file icons onto it, and with Catalyst you choose the files to copy from a selection box that lists all the files. In either case, you do not have to type in pathnames.

Neither Applied Engineering nor Checkmate provides any information about using a RAMdisk with these desktop programs, so here are a couple of tips for you. First, you must create your RAMdisk before you try to run either MouseDesk or Catalyst. Second, you have to set the prefix to let the computer know the desktop programs' location.

At the BASIC cursor] for MouseDesk, you type PREFIX/MOUSE.DESK—for Catalyst, type PREFIX/CATALYST.

Third, run the System program, not ProDOS, to avoid losing the RAMdisk you created.

At the BASIC cursor] for MouseDesk, type –MD.SYSTEM—for Catalyst, type CATSTART.SYSTEM.

Down the Road

You have to modify AppleWorks to recognize the additional memory you've placed inside your IIc. Make sure you modify only a copy of your AppleWorks disk—not the original—and that the modification program is intended for your version of AppleWorks. Both companies provide update diskettes for new versions of AppleWorks, Pinpoint,

JE520 Voice Synthesizer
for Apple II, II+ and *IIe*

JE520AP. . . . $119.95
JE523TS (Software) $ 9.95

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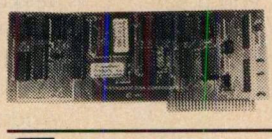

Applesurance Diagnostic Disk Controller Card
The **JE877** serves as a diagnostic tool, an assurance/maintenance tool and a dual disk drive controller. The JE877 will verify and check the operating hardware of your system each time you turn on your Apple II, II+ or *IIe*.* Test your RAM, ROM, CPU, and disk drives. Diagnostic routines may be cancelled at the touch of a key. Complete with instructions.

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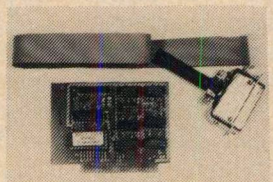

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The **JE880** Printer Interface board is an intelligent interface to most of today's popular dot-matrix graphics printers. The JE880 is fully compatible with Apple CP/M, Apple Pascal (or FORTRAN), and most other operating systems and software packages available for Apple II, II+ and *IIe*.* The JE880 is shipped configured for the Centronics standard and can be re-configured for other standards if necessary. Advanced text printing features include: video screen echo ON or OFF, auto/disable linefeed after carriage return, set/clear the 8th bit of the output data, set left margin and more! Complete with instructions.

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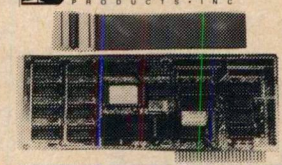

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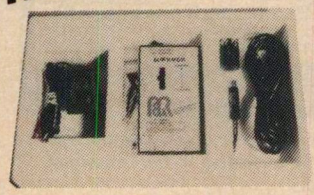

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****When using CP/M, the JE860 and JE868 will only function with Version 2.20 or earlier; PASCAL (JE868) Version 1.1 or earlier.**

CIRCLE 279 ON READER SERVICE CARD

Jeeves, MouseDesk, and Catalyst as they become necessary. Other enhancements you may see down the road include backup programs that make quick bit copies of the entire RAMdisk onto a UniDisk 3.5 disk drive, software that takes advantage of the 16-bit option, and even more memory!

In our opinion, the MultiRam CX board is worth its price, just for the vast improvement it makes to AppleWorks.

All in all, the board does everything that its manufacturer claims it can. It creates no new problems and makes AppleWorks a considerably faster and more powerful program, and once you learn how to copy files to the RAMdisk, you'll find using programs on the RAMdisk fast and simple.

Z-RAM

Z-RAM has some differences from the MultiRam that are apparent as soon as your examine the board itself. The board is made of rigid, thick fiberglass. With the exception of the 256K in the memory banks that contain optional memory, all the chips appear to be soldered, not socketed—a potential problem if any chips fail. The chips cannot work loose or develop bad chip/socket connections due to oxidation residue, but if any chips do malfunction, you'll have to return the whole board to the vendor for repair or replacement.

The MultiRam CX board comes with a five-year, transferable warranty.

The board also contains a Z80 microprocessor that, along with the supplied software, lets you run Apple-formatted CP/M programs. A clip extends from the board and attaches to one pin on a IIc motherboard chip. It pulls a signal in for the Z80 in order to run CP/M. The clip is actually a spring-loaded hook that is nearly impossible to disconnect from the motherboard accidentally. If it does come

THE EXPANDED IIc FEATURES

COMPANY	APPLIED ENGINEERING	CHECKMATE TECHNOLOGY
PRODUCT NAME	Z-RAM	MULTIRAM CX
MAXIMUM MEMORY AVAILABLE	512K	512K
16-BIT OPTION		
CATALYST AND MOUSEDESK RECOGNIZE EXTRA MEMORY		
APPLEWORKS MODIFICATIONS:		
MAXIMUM # OF RECORDS IN DATABASE	15,270	5350
MAXIMUM LINES IN WORD-PROCESSING PROGRAM	15,270	2250
MAXIMUM SIZE OF DESKTOP	425K	425K
HAS PRINT BUFFER		
LOADS APPLEWORKS IN SEGMENTS	(1)	
SAVES FILES IN SEGMENTS		
INCREASES SIZE OF SPREADSHEET		
WORKS WITH EXTERNAL CLOCK		
WORKS WITH PINPOINT		
WORKS WITH JEEVES		
RAMDISK CREATION UNDER:		
DOS 3.3		
PRODOS		
PASCAL		
CP/M		

(1) Pressing the Escape key while loading AppleWorks into Z-RAM stops the loading of program segments into memory and immediately starts AppleWorks.

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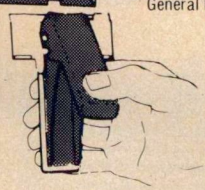

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CIRCLE 223 ON READER SERVICE CARD

loose, the hook retracts into a plastic casing, preventing it from damaging the circuitry.

One difference between Checkmate's and Applied Engineering's boards is that the latter board does not support the keyboard or even touch it. Once the board is installed, ordinary use of the computer is unlikely to ever affect its function.

With the Z-RAM board, AppleWorks performs normally, only 30 times faster.

After installing the board, make sure to run the test program on the utilities disk.

Documentation

The documentation has a detailed description and photographs of installing the Z-RAM board into the Apple IIc. Since the Z-RAM board includes a Z80 microprocessor, you can run CP/M software on your Apple IIc, and nearly half the manual is devoted to the use of CP/M. The remainder of the manual is sparse. As with Checkmate's documentation, the manual does not provide many details on using a RAMdisk. The AppleWorks modification does not require much documentation; simply follow the program's on-screen instructions, and your copy of AppleWorks will take advantage of the extra memory in your Apple IIc (see figure 2).

The Expanded AppleWorks

Both Applied Engineering's and Checkmate's software copy all of the AppleWorks programs into the computer's memory in about 1 minute, 15 seconds. Checkmate's reconfigured AppleWorks program asks you how much of the AppleWorks system you want loaded into the computer's memory, but Applied Engineering's version does not. Pressing the Escape key aborts the loading of further segments, however, and makes AppleWorks run immediately. The Z-RAM increases the AppleWorks desktop to 425K and works with Jeeves, Pinpoint, or an external clock. The Clipboard increases from 255K to 3048K and the word-processing program now allows up to 15,270 lines, and the database can accommodate up to 15,270 records.

AppleWorks performs normally, only 30 times faster, except when you're working with very large documents. Z-RAM also provides automatic segmentation of large files.

The Z-RAM has another convenient addition, a print buffer. Although the documentation does not mention this feature, Applied Engineering says that for each 256K of additional memory, Z-RAM provides the computer with a 48K buffer. So with the maximum 512K memory upgrade, you have a 96K print buffer! Now while you are printing a 15,270-record database report, you can open a new word-processing document and write one of those letters you keep putting off before the printer finishes your report.

RAMdisks

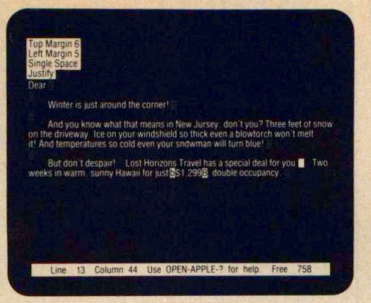
The Z-RAM package includes three disks: one for expanding AppleWorks, another for RAMdisks, and another for CP/M. The documentation contains information about the DOS 3.3 RAMdisk, but the RAMdisk documentation for the ProDOS version is only on the utility disk. Unfortunately, instead of providing the ProDOS programs on a ProDOS disk or on the back of the DOS 3.3 disk it does provide, Applied Engineering makes you convert the programs from the DOS 3.3 disk to your own ProDOS disk.

Both products offer excellent performance and are priced appropriately.

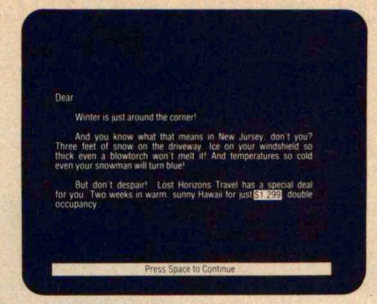
You will find a BASIC program on the utility disk that automatically copies files on a disk into the RAMdisk. Data statements in the program, into which you insert the names of every file you want copied, tell it which files to copy.

Applied Engineering also provides you with a copy of Apple's Filer for copying programs from one pathname to another.

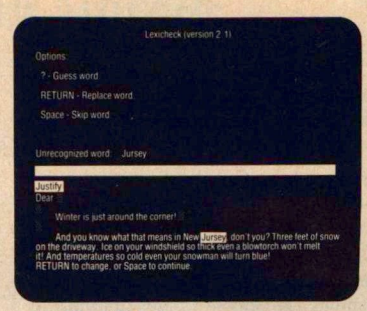
The cost of the Z-RAM board is worth the enhancements and increased power it provides to AppleWorks, and it does have the additional feature of a Z80 microprocessor, which lets you use CP/M software. The board does everything its maker claims it does and creates



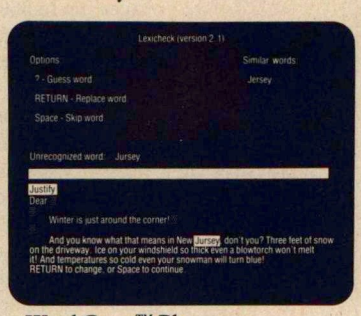
Text Entry



Display



Spelling Checker



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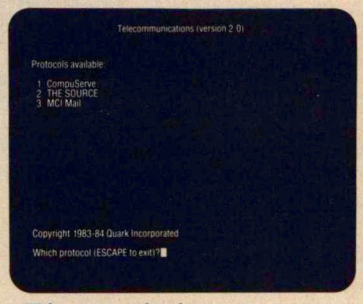
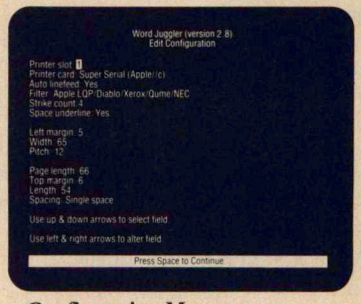


Telecommunications



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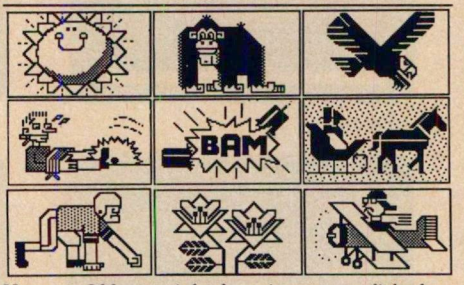

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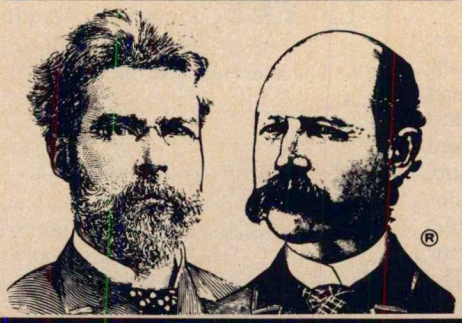

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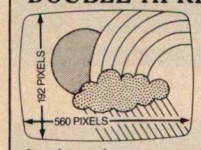

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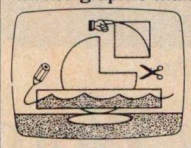

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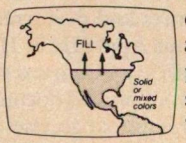

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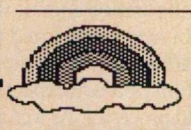

```
]LIST
10 HGR2: CLEAR: ONERR GOTO 10
20 P=1+(P=1): POKE 49238-P,Z
30 POKE 230,32+P: POKE 28,C
40 CALL-3082: POKE 49235+P,Z
50 C=C+1: GOTO 20
```

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John F. Cleary is an attorney in Merrill, Wisconsin, and Chip Carman is technical editor of A+ magazine.

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CIRCLE 108 ON READER SERVICE CARD

BY DAVID D. THORNBURG

RESTORING INDUCTIVE REASONING

Two programs that take students beyond learning facts

I'd like to start this month's column with a little quiz. The figure below shows some letters of the alphabet. Some of these letters are above a line, and some are below it. Here's the question: Should the letter F be above or below the line?

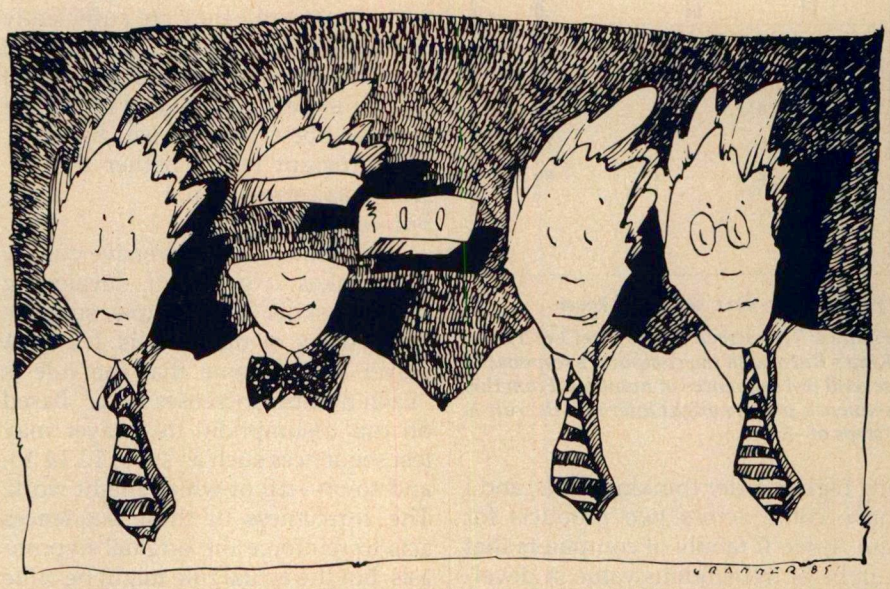
$$\frac{\text{A}\quad\text{E}}{\text{BCD}}$$

The answer to this question depends on your inference of the rule I used to determine the placement of the letters. To decide where the F should be, you first have to guess what rule I used to determine letter placement. For example, you might decide that the F should go above the line because, like the A and E, it comprises straight lines. You might also decide that it should go below the line because the letters above the line are vowels. When I show this puzzle to first-year graduate students in design, arguments quickly break out in the classroom, as various factions form around each choice.

What I find interesting about these students is that few of them are willing to entertain the notion that they should evaluate several hypotheses. As soon as the students decide which hypothesis they're going to support, each one spends the rest of the time defending that position rather than looking for alternatives.

Bits and Tricks of Knowledge

It is easy to see why students fall into this kind of trap. Much traditional schooling has been based on the accumulation of answers to questions



that have only one well-defined answer, and a lot of today's education continues to focus on the accumulation of simple connections: the capital of California is Sacramento; there are four quarts to a gallon; $3 \times 5 = 15$, etc. Although students should have a good repertoire of information that they "just know," rote learning is so pervasive in some circles that many students have learned a lot of facts but know little about thinking.

A lot of today's education continues to focus on the accumulation of simple connections.

The emphasis on memorization is so strong for some students that they tuck every new piece of information away as something they might need for a test later on. Educators give little or no thought to ways they can integrate this information into each student's larger body of knowledge.

Although the bulk of formal education seems to be devoted to the teaching of atomistic connections, a broader view of education is starting to receive renewed support from an increasing number of educators. This view suggests that education is more than a collection of atomistic connections, that it is a network or fabric.

Each of us encounters raw information every day. Human beings have the capacity to use this information through powerful intellectual tools such as inference.

When we infer something, we are deriving knowledge from incomplete information, information that may not be perceptually available to us. Although each human being can derive new information through the process of inference, the freedom to spend time learning how to do so is

ILLUSTRATION BY COURTNEY GRANNER

restricted in an educational system that emphasizes being "right" and concentrates on the teaching of material to be memorized rather than that developed by critical thinking.

Getting the HOTS for Learning

Many schools are now increasingly emphasizing the development of so-called higher-order thinking skills (HOTS)—a wonderful step in the right direction. The sad part is that this goal was ever lost in the first place.

The personal computer is one of the most powerful tools for developing higher-order thinking skills, and I have come across two products for the Apple II family of computers that can be of tremendous value in developing the inductive reasoning and conceptual capabilities of students.

```
These numbers fit the rule:
        14        11         8

1st     2nd       3rd       Yes/No
15      12        9         Yes
2       4         6         No
9       6         3         Yes
3       2         1         No
```

Press Q for Quiz or R for Recap.

Figure 1: This screen shows level 1 of The King's Rule, with the computer's response to several test sequences of numbers. From this sequence, players might infer that the rule is "steps of -3."

THE KING'S RULE

One of these programs, The King's Rule from Sunburst Communications, was developed by Professor Thomas C. O'Brien of the Teachers' Center Project at Southern Illinois University at Edwardsville. O'Brien's software exemplifies his view that "learning is not a spectator sport."

The King's Rule is a game in which the players get a sequence of three numbers that obey a secret rule—for example, 1 2 3. The players can then enter other sequences of three numbers, and the program indicates whether those numbers follow the rule or not (see figure 1). The goal is for the players to formulate and test hypotheses until they are sufficiently confident of the rule to take a test on it. In the test, the players get sets of three numbers and have to indicate if each set obeys the rule (see figure 2). The program tells whether the answer was correct or not.

Subversive Learning

This game has a subversive quality that makes it good for developing thinking skills. For example, suppose the first set of numbers is 1 2 3. A player may assume that the rule is "Each number increases by 1." Based on this assumption, the player may test sequences such as 4 5 6, 13 14 15, and so on—all of which might work. The correctness of these sequences acts to reinforce the original hypothesis, but the actual rule might be quite different. For example, if the player tested 2 4 6 and found that it worked,

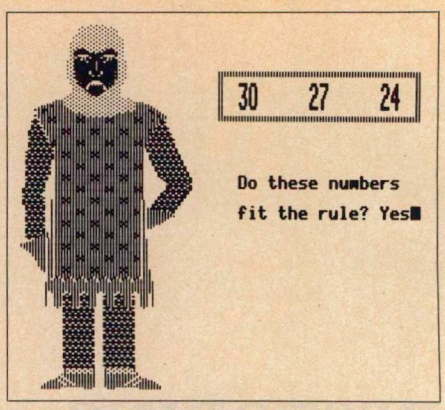


Figure 2: Screen showing a test for the rule

the original hypothesis would be disproven! At this point, the player might test a new hypothesis—that the numbers differ by a fixed increment. This way, 1 2 3, 2 4 6, 300 200 100, and 5 8 11 all work.

Players of The King's Rule quickly find out (especially at the higher levels) that an initial hypothesis may be wrong. Successful players of the game soon discover that in order to infer a correct rule, you have to try not only number sequences that work but also those that do not. This aspect of problem solving—learning from failure—is the hardest to get across to students.

One of the greatest barriers to creativity is the emotional block of "needing to be right the first time." Teachers using The King's Rule in the classroom can help students undo this block in the following way: Ask each student working with the program to present three or four hypo-

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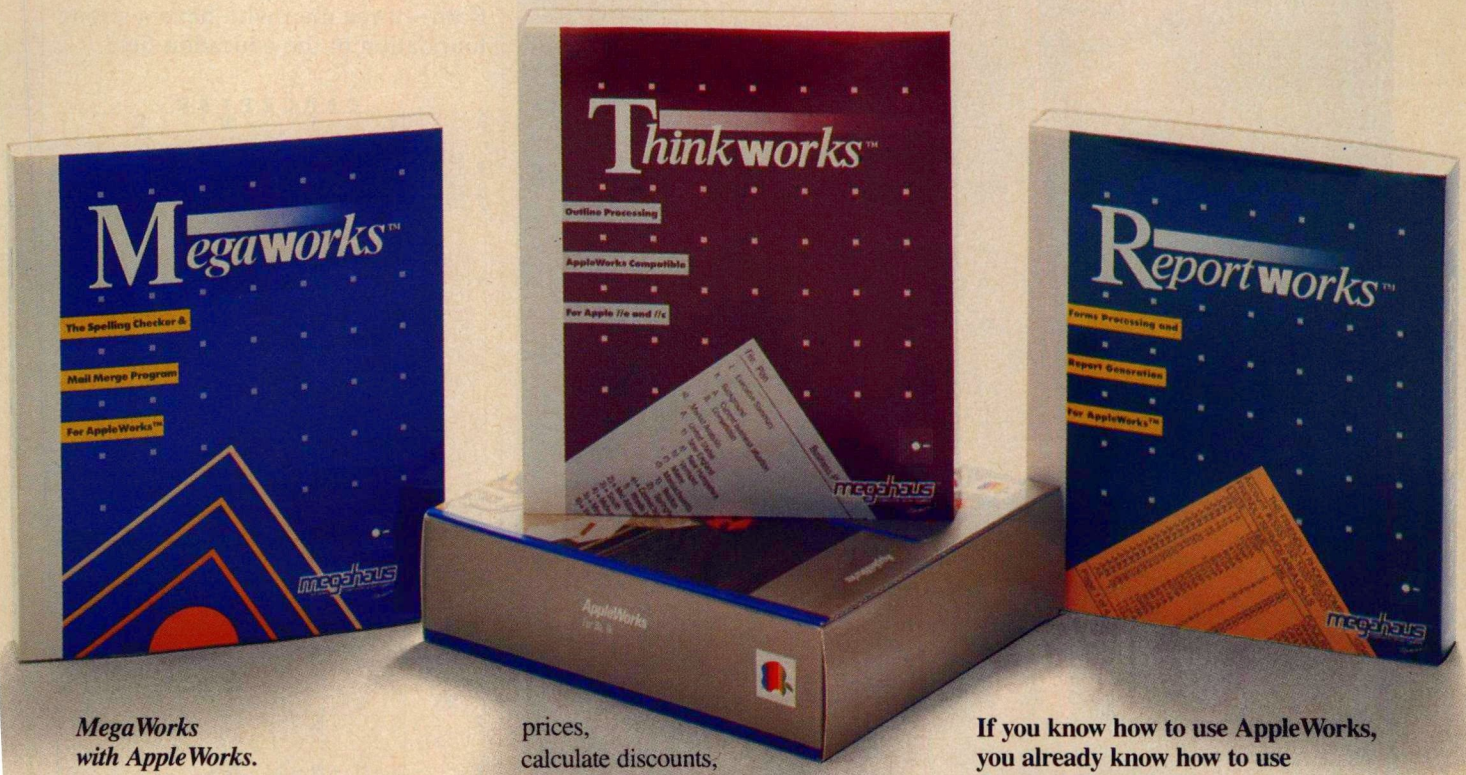

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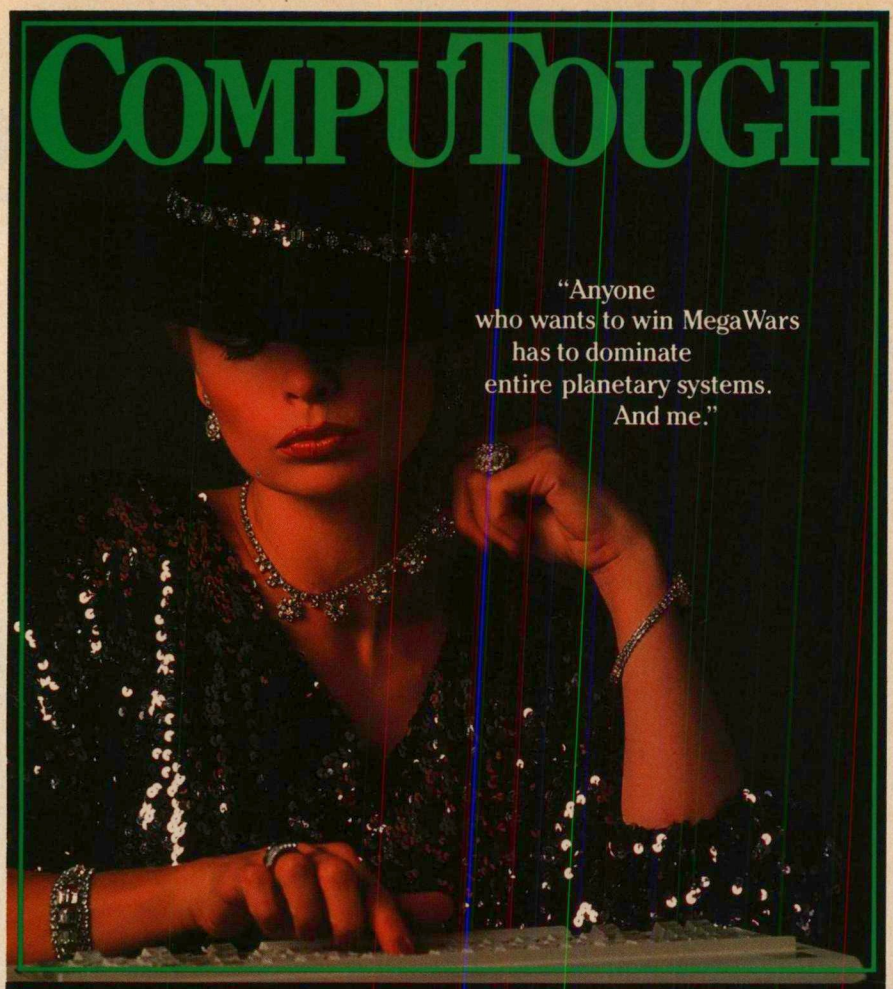
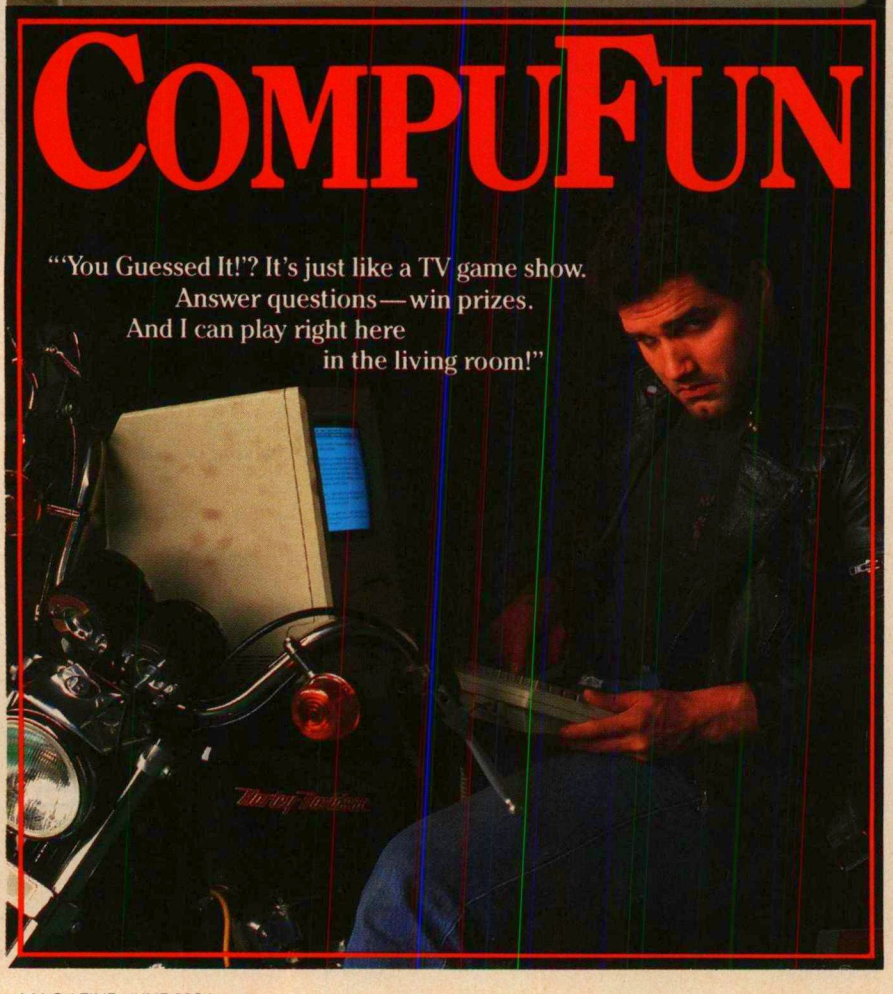




thetical rules, all of which the first set of three numbers obeys. Then, by testing each of these hypotheses in turn, the students can gain confidence in their final choice. Their final choice may have been their first guess, but at least they know that other solutions are possible.

CONCEPTOR

The second program in the HOTS category I want to mention is Conceptor from Mentor Learning Systems, developed by Drs. Rich Schmieder, Les Edwards, and Harley Roth—three men who have a strong foundation in the education field.

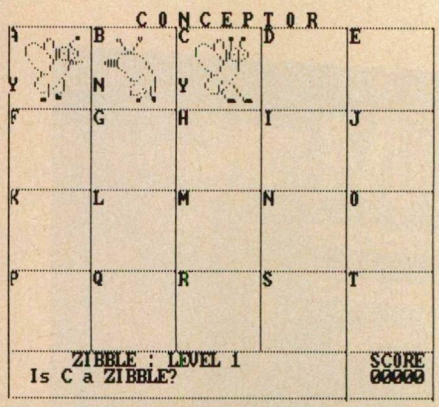


Figure 3: Conceptor screen showing two abstract patterns. The first is a ZIBBLE, and the second is not. Players need to decide if the third picture is a ZIBBLE or not.

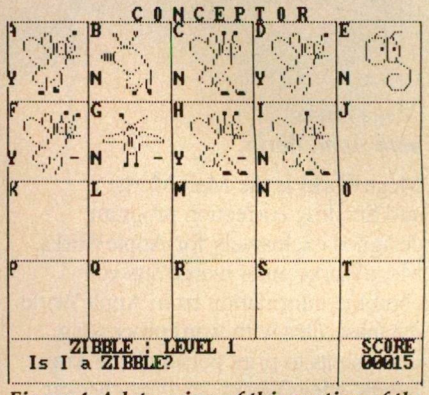


Figure 4: A later view of this portion of the same game. Successful players will have determined that a ZIBBLE is a bug with shaded nose and eyes.

Conceptor is a skill-building game that expands users' capacity to perceive and classify information. Rather than working with numerical patterns, Conceptor uses abstract geometric designs as the objects of analysis and hypothesis development. Each level of the game starts by drawing two images on the screen (see figures 3 and 4). The first figure is identified by a fanciful name ("birl," for example). The second figure may have many of the properties of the

first one, but it is *not* a birl. A third picture appears on the screen that is different from either of the first two pictures, and players have to decide whether it is a birl or not. Because the first two pictures may not make it obvious which attributes are important to "birlness," the chances of guessing correctly about the third picture are not high. For each successive picture, the players can test and refine hypotheses regarding the attributes of relevance, however, and proceed to home in on a well-developed rule for determining whether each successive picture is a birl or not. To win the game, players must correctly identify 15 of the 18 pictures and have no failures in the last row.

As with The King's Rule, Conceptor encourages the development and exploration of hypotheses. One difference between these two products is that The King's Rule lets you test hypotheses as much as you want; Conceptor expects you to find the critical features of a picture in a fixed number of tries. Another distinguishing feature is that The King's Rule uses patterns of numeric sequences and Conceptor uses abstract geometric shapes.

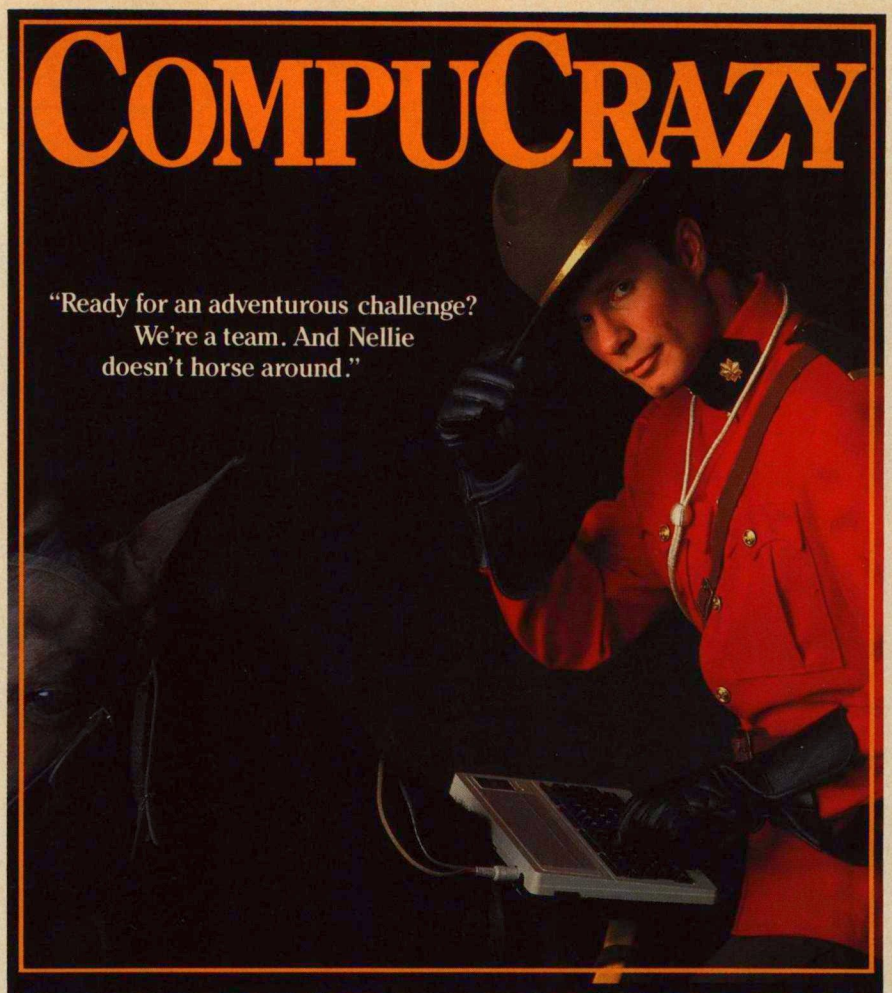
By the way, the F goes above the line. ✚

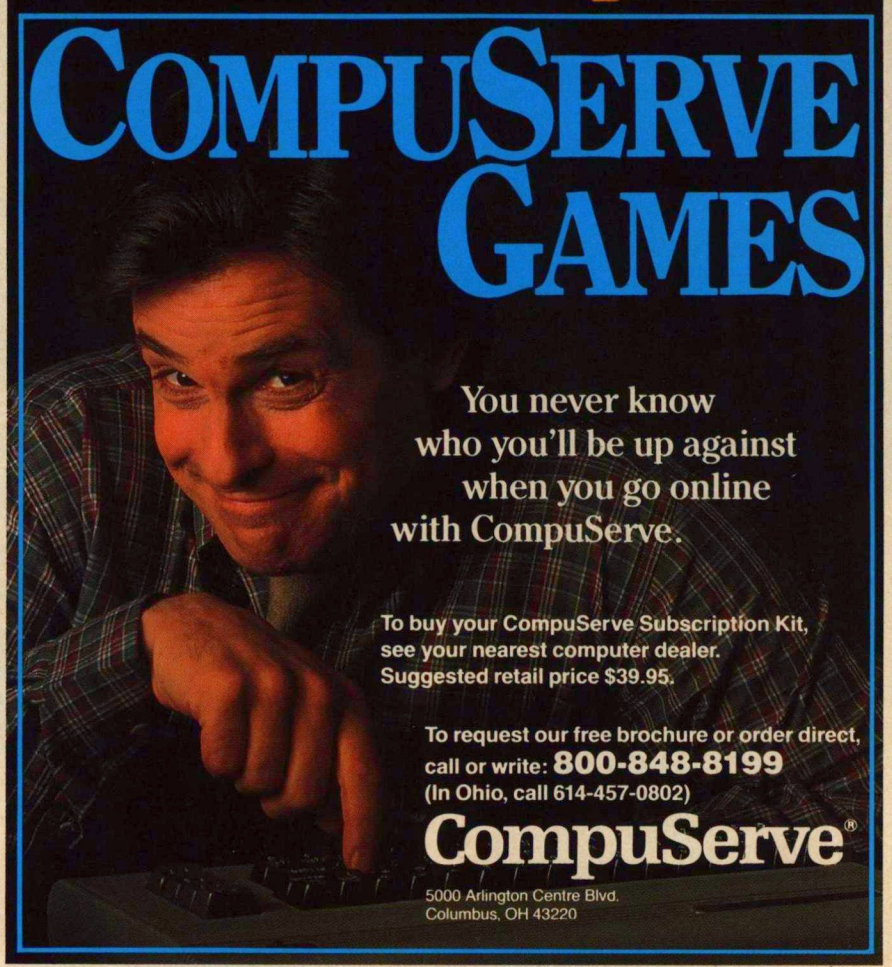
David Thornburg is the author of 12 books on computing and a monthly contributor to A+. He is also the designer of Calliope, an information processor for the Apple IIe, IIc, and Macintosh computers. Dr. Thornburg enjoys hearing from readers and can be reached in care of this magazine.

PRODUCT INFORMATION

The King's Rule
Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
(914) 769-5030
List Price: $59
Requires: Apple II Plus, IIe, or IIc; 48K RAM
CIRCLE 351 ON READER SERVICE CARD

Conceptor
Mentor Learning Systems
1825 De La Cruz Blvd.
Santa Clara, CA 95050
(408) 988-4114
List Price: $49.95
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM
CIRCLE 352 ON READER SERVICE CARD





CIRCLE 271 ON READER SERVICE CARD

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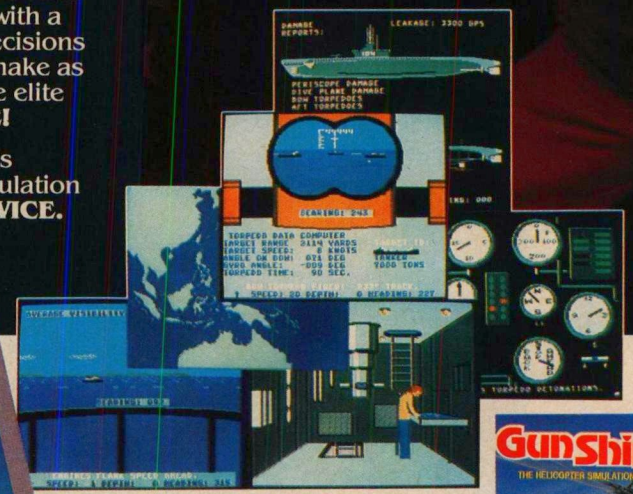

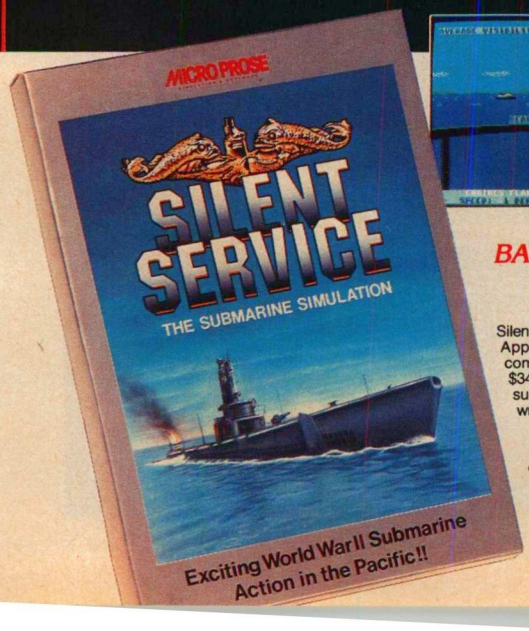

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Photo courtesy Baltimore Maritime Museum

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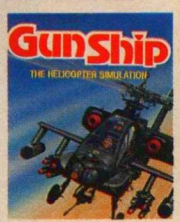

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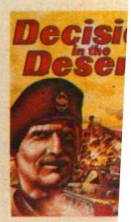

You are in comm North Africa 19

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SIMULATION • SOFTWARE

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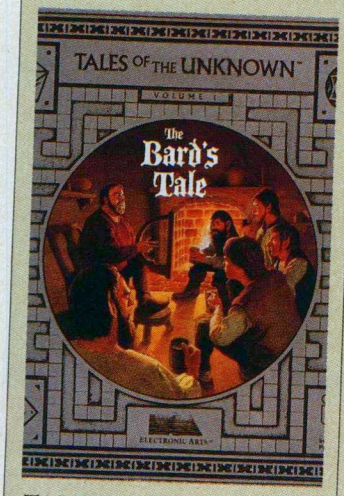
CIRCLE 111 ON READER SERVICE CARD

That's Entertainment



TALES OF THE UNKNOWN VOLUME 1: THE BARD'S TALE

THE GREAT AMERICAN ROAD RACE

THE MIST

HARRIER STRIKE MISSION

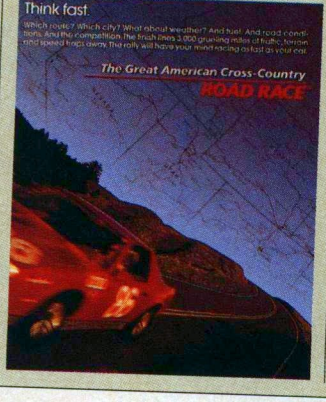
RAGTAG CREW VS. EVIL DESPOT

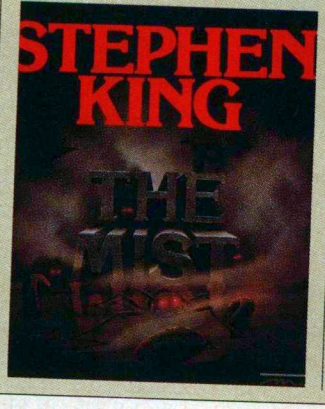
It is nearly evening when you sight the battered silver A marking an otherwise nondescript facade. Once this was the Alchemists' Guild Hall—but that was years ago, before Mangar the Dark cast a spell of Eternal Winter on peaceful, contented Skara Brae; unleashed a monster horde; and swept aside alchemists, sorcerers, warriors—anyone who might oppose his rule. Yet, if the bartender at the Scarlet Bard spoke sooth, some resist Mangar's rule, and you now stand before the hall of the secret Adventurers' Guild!

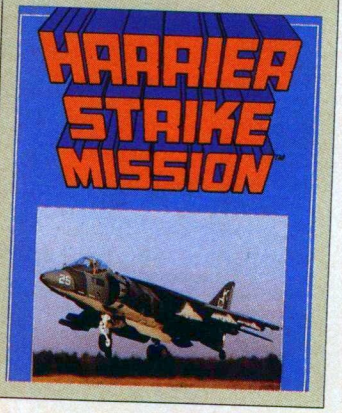
In The Bard's Tale, you lead a ragtag crew of up to six heroes on a shining quest to overthrow the wicked Mangar, a quest that all too soon proves to be a distant star. Monsters of every description, from innocuous kobolds to deadly spell casters and fearsome dragons, roam Skara Brae's labyrinthine byways. Others lurk in abandoned buildings and dungeons or take the form of guardian monoliths. A long-duration shield, second sight, and levitation spells (verified via on-screen pictographs) help even the odds; still, only a foolhardy braggart would lead a party from the guild hall after dark.

You have to explore all the town's real estate and some 16 dungeon/tower mazes for clues, one-of-a-kind magical artifacts, and monsters (whose booty is your chief source of income). Good mapping is critical where your very survival often depends on reaching the nearest temple for healing or getting to Roscoe's Emporium for a spell-power recharge.

Although exploration and combat are your main activities, character development remains an ongoing concern. Heroes may include warriors, spell-singing bards, hunters, thieves, and four classes of magic users from a roster of up to 30 player-created characters. With 6 races, some 13 parameters (such as strength, dexterity, armor class, hit points, and the like), and the most elaborate of schemes for character advancement, you can tailor parties to suit virtually any strategy. You can even recruit your favorite, fully developed characters from Ultima III and Wizardry. Two or three such veterans are a great help in get-



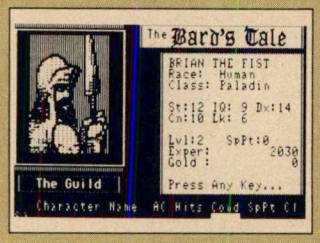




ting started, especially since members of each party share experience and gold won in combat equally. Developing Bard's Tale characters from scratch is one of the more entertaining aspects of play, however.

Featuring full-color displays of streets and buildings, animated monsters, and even a sky that darkens at night, this first of Electronic Arts' "Tales of the Unknown" quickly envelopes you in one of the all-time great adventure challenges. Pacing is leisurely—perhaps a bit too much so during combats—and the documentation has some curious gaps.

Immensely entertaining, The Bard's Tale is begun; but only you can



supply the ending of a saga fit to be sung through the ages.

Jeff Hurlburt

Tales of the Unknown Volume 1: The Bard's Tale
Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
(415) 571-7171
List Price: $44.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive (second drive, SpeeDemon board, and 128K RAM optional)
CIRCLE READER SERVICE NO. **400**

SEE THE COUNTRY AT 200 MPH

The Great American Road Race is a cross-country car-rally simulation. The object of the game is to drive from a city on the West Coast to a city on the East Coast and place among the top ten finishers. As in a real rally, you must pick the best route from city to city while racing the clock on each leg of the journey. If you fail to reach a destination in the allotted time, you are disqualified.

Mechanically, this game is a joystick-operated driving game similar to Turbo. The graphics aren't spectacular—a basically stationary background and a "moving" road, night/day and bad-

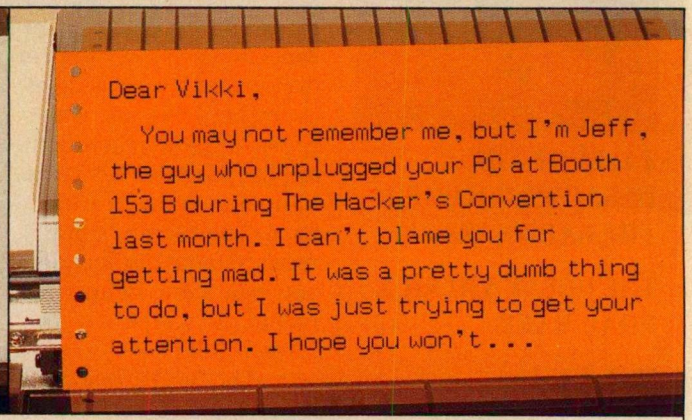
You must pick the best route from city to city while racing the clock.

weather screens—but they are adequate. Your instrument panel displays a fuel gauge, tachometer, speedometer, radar, and time and mileage indicators. You have plenty of company on the road in the form of other cars, numerous motorcycles, and an occasional policeman.

At the beginning of the game, you pick your competition from nine possible fields. One field is permanently on the disk, and you can update the

Dear Vikki,

You may not remember me, but I'm Jeff, the guy who unplugged your PC at Booth 153 B during The Hacker's Convention last month. I can't blame you for getting mad. It was a pretty dumb thing to do, but I was just trying to get your attention. I hope you won't...



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I kept coming back to try to do a little better or try a new route.

others to create lively competition among friends.

Next you pick your first destination city from a map of the United States. Your allotted time is displayed, along with road conditions ahead. You can generally choose from two or three possible routes, although one is usually the most direct.

The driving itself is fairly realistic. You must watch the tachometer as you accelerate from first gear through fourth. You shift gears by letting go of the throttle (the left joystick button) and pushing forward once on the stick. Then push the button again to accelerate; pull back on the stick to brake. If you fail to shift when the car redlines at 9800 RPM, you will blow your engine and have to push the car to the nearest gas station. You'll also have to push it if the gas tank runs dry.

Traffic near a city is always heavier than on the open road, and if you are near a city at rush hour, watch out! Try driving more than 150 mph at rush hour! The major goal is to beat the clock, and the main obstacles are other vehicles, the cops, running out of gas, or blowing your engine (by forgetting to shift gears). If you collide with another vehicle, you skid to the side of the road and come to a stop, losing precious seconds as you accelerate again to cruising speed (somewhere between 150 mph and 225 mph). If a policeman catches you, he makes you lose even more time, presumably while he chews you out for speeding. Be aware of your radar, which warns you of nearby cops so you can slow down or, if you think you can outrun them, speed up.

Gas is available every 100 miles, but it is easy to miss the gas station—disastrous if you are almost out of fuel. Fortunately, if you finish one leg of the journey under the time limit, the extra time you've accumulated is added to the next leg, and you can use that time to safely refuel.

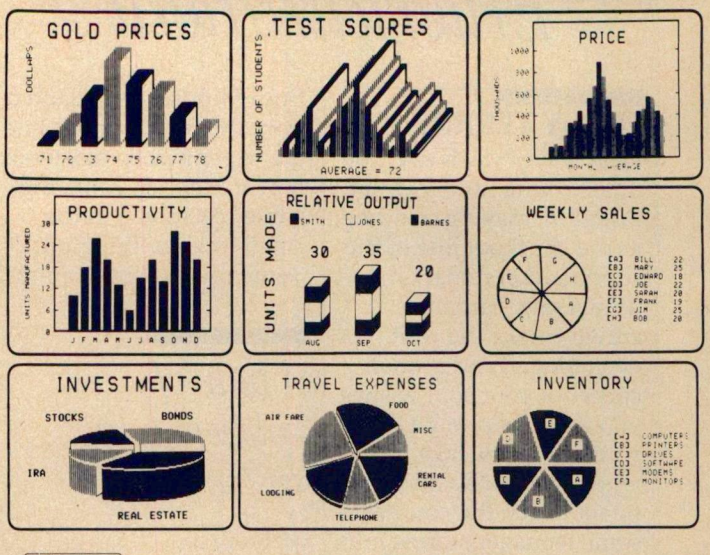
The Great American Road Race seemed very difficult to me at first, but it became more and more fun as I got the feel of the game. I liked the pressure I felt at the beginning of each new leg, and I kept coming back to try to do a little better or try a new route or strategy.

Rusel DeMaria

The Great American Road Race
Activision
2350 Bayshore Frontage Road
Mountain View, CA 94043
(415) 960-0410
List Price: $39.95
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM

CIRCLE READER SERVICE NO. **401**

AlphaChart!



CHARTS! Don't pay more for less! The pictures shown above are examples of charts created with **AlphaChart!**, perhaps the most powerful and friendly Apple II chart program on the market. Within seconds, keyboard-entered data can be converted into picture-perfect pie or bar charts, in 26 user-selectable styles, automatically scaled and labelled, and in color or black and white. And **AlphaChart!** prints on most dot matrix printers. If you want to customize your charts by adding extra artwork or text, or display them in a slide show, **AlphaChart!** comes with these valuable extras.....

SLIDE PROJECTOR for orchestrating automated, stand-alone screen presentations of a series of charts, timed and sequenced by the user. This program alone is worth the cost of the disk. It can be used with any graphics files created with any program.

GRAPHICS EDITOR for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

SHAPE TABLE EDITOR for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

"The software does much more than the advertisement suggests. Without question, this is among the best buys if software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

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FOGGY TERROR

Heat waves wash over the unassuming little town of Bridgton, making standing in the checkout line of the supermarket remarkably unpleasant. Summer crowds make the wait even longer, and a small corner of your soul wishes you were swimming with your son at the lake. Just when you think you might finally reach the counter, some teenager storms into the store, screams something about a fog eating his buddy, and charges right out. Seconds later, a thick, impenetrable mist rolls past the store, and the once docile shoppers transform into a confused, hysterical mob.

So begins The Mist, a text-only adventure game from Mindscape. Adapted from the book of the same name penned by master of horror Stephen King, the game places you in the small town of Bridgton. Somehow you must unravel the origin of the mist and find out how to disperse it. And somewhere out there is your son. Of course, you must survive first.

A pair of soldiers hang in the meat locker.

That is not going to be easy. A pair of soldiers hang in the meat locker. Poor Norm the stock boy gets nabbed by some slimy tentacles. And, worse, if you hang around the supermarket too long, Mrs. Carmody whips the mob into a frenzy, convincing them that a human sacrifice is necessary to sate the evil and save them. You do not need a Ph.D. to figure out who is going to be the human that will be sacrificed to a trio of avian nasties. I don't even want to talk about the dragonfly that keeps ripping my head off with its tongue.

The prose rolls along, providing enough detail to keep your senses alive. Mind you, if you want real Stephen King, you should buy his books, but The Mist, the game, does a commendable job of supplying the required visual imagery. It could be improved to catch more of the subtleties of the writing, but all in all, a good job.

Poor Norm the stock boy gets nabbed by some slimy tentacles.

I wish I could be more positive about the parser structure. The Mist employs a structure that is less sophisticated than that of offerings from Infocom, Trillium, and Synapse/Brøderbund, however. It picks up on key words, and you must often wrestle with the vocabulary in order to make

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However, Sensible Speller is still just as easy to use. It shows you misspellings in context, suggests the correct spelling, and allows immediate replacement of misspelled words with correct ones.

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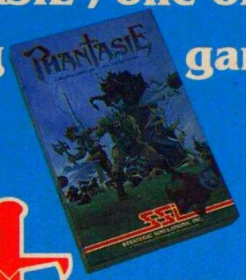
*Sensible Speller ProDOS works with the following word processors: AppleWorks, AppleWriter-ProDOS version (Apple Computer, Inc.); Format II Enhanced-ProDOS (Kensington Microware); Mouse Write-text files (Roger Wagner Publishing); MouseWord (International Solutions); PFS:WRITE-ProDOS (Software Publishing, Inc.); Word-Talk (Computer Aids) and WordPerfect (SSI Software); Word Juggler (Quark Inc.); Writing Wizard (Scarborough Systems); Zardax-ProDOS (Computer Solutions); and others. Owners of trademarks indicated in parentheses. Black's Law Dictionary (West Publishing, Inc.); Stedman's Medical Dictionary (Waverly Press, Inc.)

Sensible Software, Inc. 210 S. Woodward, Suite 229, Birmingham, MI 48011 (313) 258-5566

CIRCLE 106 ON READER SERVICE CARD

First, there was PHANTASIE™, one of the most popular fantasy role-playing games ever made.



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A small section of the wilderness your band must explore.

A sample of recruits from the Adventurers' Guild.

You must map out dungeons and fend off hideous monsters.

Your group has found Pluto's Palace in the Netherworld.

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CIRCLE 131 ON READER SERVICE CARD

That's Entertainment

your actions match your intentions. The command scheme is a step up from the old two-word commands, but the game still needs one more step in order to catch up to those of the aforementioned companies.

Overall, I give The Mist good marks. Stephen King sells an awful lot of books, The Mist included, because of his intricate stories. I think you will find yourself plugging in this disk a little more often than average because the plot hooks you and holds you.

I recommend that you play this game during the day, because if you play it at night, things might seem to get a bit foggy. And thinking about poor Norm, well, that might keep you awake more than figuring out how to solve some of the puzzles. But those are only tricks of the mind, right. Right?

Russ Lockwood

The Mist
Mindscape
3444 Dundee Road
Northbrook, IL 60062
(800) 221-9884
In IL (800) 942-7315
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive—or Macintosh

CIRCLE READER SERVICE NO. **402**

HARRYING THE ENEMY

"Not long ago, on an island coast not far away," runs the tag line on Miles Computing's impressive Harrier Strike Mission logo as it rolls up on the screen and a wire-frame fighter loops toward you and scatters the letters.

Where? And when? During the Falkland Islands undeclared war between Great Britain and Argentina in 1982, the carrier-based Harrier Jump Jet was the conflict's most decisive weapon. Harrier Strike Mission features the U.S. Marine Corps' version, the AV-8B Harrier II. Perhaps the island here is actually Grenada, although I've always envisioned Silicon Beach's game Airborne, in which a lone gunner tries to hold off an unending stream of paratroopers, copters, and jets, as taking place there.

Your Harrier has *three* heat-seeking, never-miss Sidewinder air-to-air missiles to use against *five* enemy jets, each with its own missiles. Prepare for some nimble dogfighting to make up the difference. The Pentagon was more generous with its flares, giving you 16 to drop as heat decoys for the SAMs (surface-to-air) missiles that the 10 tanks send up for you. Only the twin 30mm Aden cannons have an unlimited supply of ammunition, and they are effective against the

You have less than 2 minutes before a missile blows you into a cloud of toothpicks.

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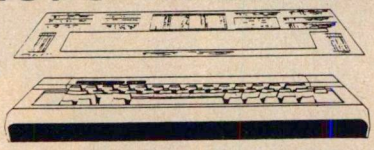

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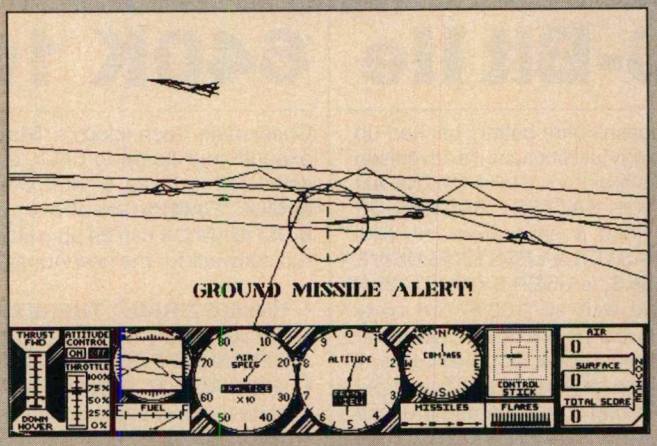
enemy tanks, fuel depot, tank barracks, and headquarters. If you can lock your sights on an enemy jet, the cannon will down it as well.

The sound effect, piercing as a dentist's drill, must have been conceived as one more offensive weapon in the Harrier's armory. Mercifully, a keystroke silences it. You can use a mouse or a joystick for main guidance and activate the rest of the controls—cockpit views, throttle, and thrust—from the keyboard. Their layout is awkward, though, and if you have to look down, you're done for!

Until someone designs a helicopter flight simulator (like Huey, available on other systems), this V/STOL—Vertical/Short



Takeoff and Landing—Harrier Jump Jet is the only craft that can hover as well as fly on the Mac. The excellent manual clearly shows how its four rotating jet nozzles and reaction jets on the wing tips permit it to maneuver vertically and even stop suddenly in midair.

The game has no convenient mode for fully savoring the challenge of this state-of-the-art-of-war flying machine, however, unless you've progressed far enough to take out all the targets immediately. Poised on the deck of the carrier, you have less than 2 minutes as a novice and only 50 seconds as an expert before a missile blows you into a cloud of toothpicks. In the novice's practice mode, your craft repeatedly regenerates, but the experience is like learning to rollerskate through a hornets' nest. Harrier Strike Mission is not so much a flight simulator—although it could be—as it is a combat cruncher. For those of you who want an aeronautically interesting zapper, this game will be a must for your Mac.

Anthony Reveaux

Harrier Strike Mission
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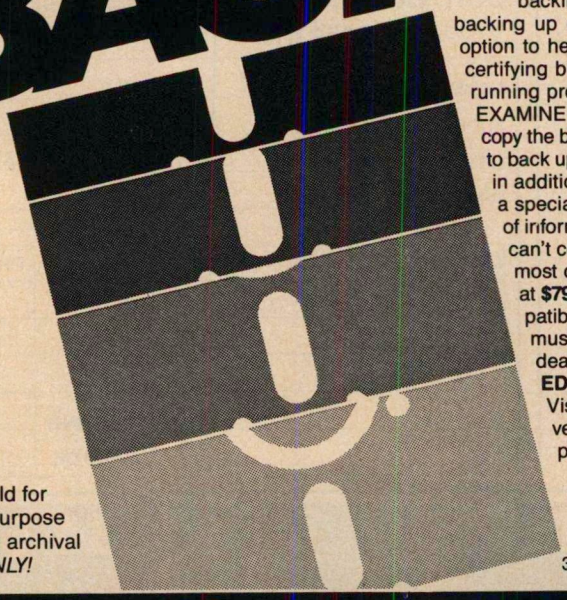

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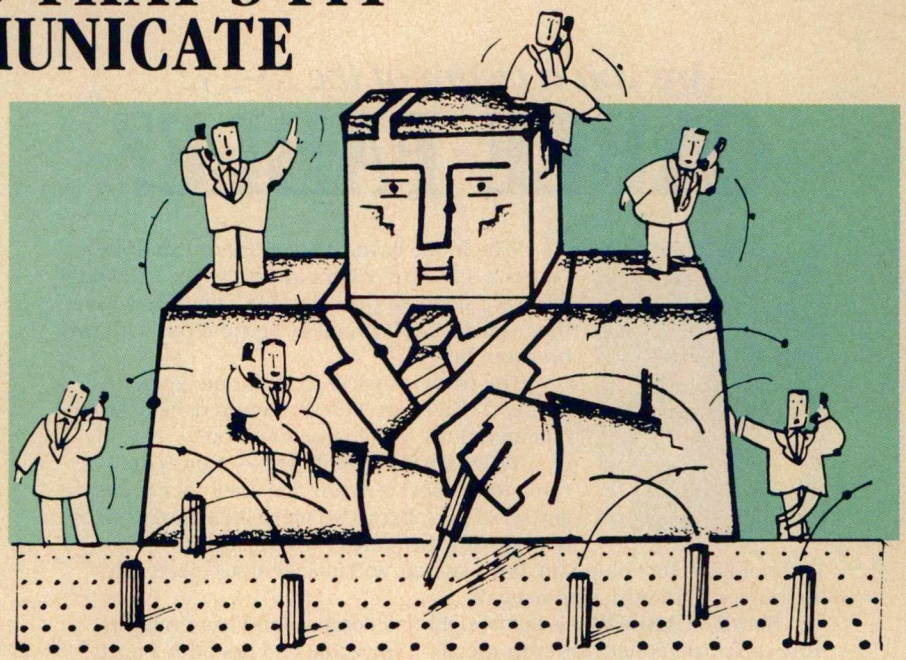
BY RUSS LOCKWOOD

ALL THE NEWS THAT'S FIT TO TELECOMMUNICATE

MIT, BBS, BRS, AMA, IAC, and a GEnie in a modem



When publishing executives from The Washington Post, Dow Jones, Times-Mirror, Knight-Ridder, and other newspaper companies attend a conference, the last thing they want to hear is that newspapers are obsolete and outdated. Yet that is exactly what MIT Professor Nicholas Negroponte, Director of the New Media Laboratory, told more than 800 senior executives at the annual Information Industry Association convention.

Negroponte argues that traditional newspapers cannot cope with the exploding mass of information. "For just delivering the news, the newspaper has got to be the wrong thing to do," he claims. He suggests replacement of the familiar newsprint with computerized "ultra-personal" electronic editions geared to the interests and needs of individual readers.

Negroponte points to a prototype system developed at MIT as one alternative. A computer, equipped with a personalized reader profile and tied into a network, sifts through the day's news, selects appropriate articles, and presents a personalized edition. This ultrapersonal newspaper can even integrate electronic-mail messages into the mix of articles. The system displays the articles on the screen, prints them out on paper, or converts them into speech.

Preposterous? Perhaps, but some telecommunications services already offer electronic "clipping." In any case, don't answer "Macintosh" to the question "What's black and white and read all over?" just yet. As with most ventures, the bottom line is the bottom line. Costs and profits remain the biggest obstacle, especially when pricey technology competes against a product that costs as little as 15 cents for 100 pages of news and advertising. Still, the idea of instant, personalized information is appealing, and

Think of washing your hands once and for all of smudgy newspaper ink.

the thought of washing your hands once and for all of smudgy newspaper ink should bring a smile to your face.

Genie in a Modem

According to legend, freeing a genie from a bottle entitles you to three wishes. Telecommunications enthusiasts would wish for unlimited information, ease of use, and low cost. Companies wish for low initial investment, fanatic customer loyalty, and big profits. Although apparently a contradiction in supernatural terms, a new service from General Electric Information Service (GEIS) called GEnie is well on its way to granting all wishes.

GEIS charges an $18 setup fee ($28 if you are going to use 2400-bps service) and then $5 per hour of non-prime-time use—roughly 6 P.M. to 8 A.M. weekdays and all day weekends and holidays. The $5-per-hour charge applies to 300-bps, 1200-bps, and 2400-bps service. Some access cities charge an extra $2 per hour. Prime-time access (8 A.M. to 6 P.M. workdays) costs $35 per hour.

How can this $5-per-hour charge be possible, even at higher speeds? Well, GEIS already operates a nationwide network for corporate users. When the business day ends, the network becomes idle. GEnie simply taps the network's unused capacity.

GEnie is a new service, so it does

ILLUSTRATION BY MACIEK ALBRECHT

not have the variety and depth of entrenched services such as CompuServe and The Source, but GEIS is making progress, and as more people join, more offerings will presumably appear. Dedicated system operators have set up several roundtables, which are similar to special-interest groups on CompuServe. Two that will interest *A+* readers are the Macintosh roundtable and the Apple II/III roundtable. Each offers bulletin boards, real-time conferences, and software libraries for uploading and downloading of public-domain programs. Also, at the time of this writing, an electronic edition of *A+* is scheduled to become available on GEnie in the second quarter of 1986.

GEnie represents an incredible bargain and promises a bright future.

As always, cross-country communications provide a variety of opinions on a plethora of topics, from entertainment to expansion boards. You can pick up quite a bit of information by perusing the bulletin-board messages and participating in on-line conferences. For example, in a subject near and dear to my heart—Macintosh telecommunications—an especially spirited bulletin-board discussion pitted MacTerminal vs. Red Ryder. The result, according to one user: "The MacTerminal disk is the best mudscraper yet."

As an added attraction, GEnie is making a conscious effort to entice industry luminaries on-line for real-time conferences with subscribers. For example, the February on-line conference featured *A+* editor-in-chief Maggie Canon. Now that's a direct line to your favorite magazine.

Of course, more roundtables are available in case you need a break from Apple computers. Other GEnie features include GEmail, an electronic-mail system; Online Swap, a forum that is set up like the classified section of a newspaper to buy and sell items; and *Computing Today*, an on-line magazine.

The GEnie bulletin-board system does have some less than dreamy qualities, however. It divides information into a confusing mixture of categories and topics, so novice users must take some time to become familiar with the system. Also, GEnie is designed for half-duplex operation, which means your software must echo characters you type to your screen. If it doesn't, you must remember to enter a Control-R before entering your password to make the characters you type appear on the screen.

Nevertheless, at $5 per hour for 300-bps, 1200-bps, or 2400-bps service, and with a company of GE's stature in for the duration, GEnie represents an incredible bargain and promises a bright future.

BBSs Forever

About a year ago, I reported a rumor that blueprints of the Three Mile Island nuclear power plant were available on hacker bulletin-board systems (BBSs). Well, someone code-named Prime confirmed it. Prime went on to say, however, "BBSs come and go so often that unless you happened to have saved [the plans] to disk, it's unlikely that you will ever see them more than once."

BBSs continue to thrive, as more

Are you a victim of the RS-232

CABLE FABLE?

Which one have you heard? For example: "It has a 'standard' RS232 interface," or "All you need is a standard printer cable," or "If you have the manuals, I can probably figure it out with my breakout box."

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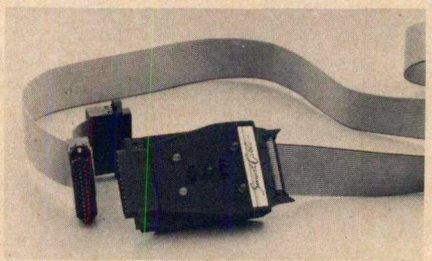

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and more people discover the speed, convenience, and fun of establishing electronic ties across the country. For your telecommuting pleasure, we present a pair of new BBSs.

The Hotline BBS runs on a IIe with a Sider hard disk, an Applied Engineering RamWorks 512K expansion board, and Let's Talk software. It operates 24 hours per day at 300/1200 bps. The settings are 7/1/N, and the phone number is (818) 766-6442.

Another 24-hour BBS is the A+ Breadboard. It features private electronic mail, special-interest groups, games, and an electronic magazine. It originates in Manitoba, Canada, and operates at 300/1200 bps. The phone number is (204) 687-5510.

TELETIPS

This section deals with news, views, and breakthroughs in the telecommunications world. It also offers a quick overview of new features added to services I have already reviewed. I obtain the information by culling the numerous press releases that streak across my desk each day.

Rome Wasn't Built . . .

Out of the pages of CompuServe's *Online Today* comes the news that MCI Mail, ITT Dialcom, GTE Telenet, and other electronic-mail companies are working on a plan to interconnect their services. The idea of a unified electronic mail system is appealing, but don't expect anything soon. Considering the differences in costs and standards, these firms may need years to work out an acceptable plan.

Playing the Numbers

Jeffrey Hall, vice president of international marketing for Comp-U-Card International, claims almost 2 million people bought merchandise, made travel reservations, and arranged other services through the company. The total price tag: $100 million.

Howard Reis, vice president of business planning for Covidea, a new home-banking venture by AT&T; Time, Inc.; Chemical Bank; and Bank of America, claims U.S. banks have invested $500 million in electronic home banking. Only 60,000 people nationwide use a home-banking system, but Reis estimates the home financial-transaction market could be worth $12 billion within ten years if each household that now receives cable TV subscribed to home banking.

IAC on BRS

Information Access Company (IAC) announces that its Trade and Industry ASAP III full-text database

More and more people are discovering the speed, convenience, and fun of establishing electronic ties.

of 130 business publications is available on the BRS Information Technologies telecommunications service. This database joins five other IAC databases—Magazine Index, Trade and Industry Index, National Newspaper Index, Legal Resource Index, and Newsearch—on BRS.

What's Up, Doc?

The Department of Family Medicine at Case Western Reserve University School of Medicine operates a free, 24-hour, computerized, medical-information service called Doc-in-a-Box. Anyone with a medical question can leave a message, and one of the staff of physicians will answer—usually within 24 hours. The service cur-

Does your interface give you

A LONG FACE?

It's sad! The hours that people spend trying to get two pieces of hardware interfaced through the serial ports. They buy "standard" cables that don't work! They call the "Tech Assistance" line and that's busy. They fiddle for hours with a breakout box and still don't get the correct pin configuration.

Well, now they can smile and use those hours for something productive!

The **SMART CABLEMAKER SC821** has arrived.

Unlike other cable devices claiming to resolve RS232 connections, SC821PLUS's LED display gives a complete graphic display of the interface. And you know the interface is correct because your system is already up and running.

Total time to interface 2 pieces of equipment and figure the correct interface? About 30 seconds! Try that with a breakout box.

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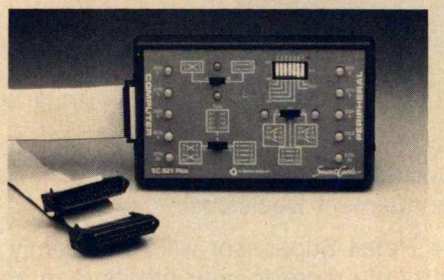

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CIRCLE 336 ON READER SERVICE CARD

rently draws 150–200 callers a week.

Not to be outdone, the School of Dentistry started an electronic Dental Clinic. I'm sure Case Western officials would be interested in any suggestions on nicknaming this service.

AMA vs. GTE

The American Medical Association (AMA) filed a $15 million suit charging that GTE Telenet Communications had failed to adequately market the AMA's on-line service, Medical Information Network (Minet). GTE countersued for $73 million, claiming Minet did not carry commercially viable information. The whole matter is still in court, and Minet continues to be available through Telenet.

The home financial-transaction market could be worth $12 billion within ten years.

Legal Eagles

Veracorp, a subsidiary of Lawyers Co-Operative Publishing Company, and Mead Data Central are offering Veralex, an on-line legal-database service that targets lawyers in solo practices. Veralex shuns the word-search system of retrieving information—users must know the correct citation. Veracorp charges a one-time fee of $295, $60 per month, and a variety of charges for requested items.

Logging Off

Before I close, let me plug the A+ BBS. It is a direct line to us, and I do hope that you will take the time to send along your comments, critiques, and criticisms on this column.

What are the other ways? You can write a (postal-service) letter to A+ (11 Davis Drive, Belmont, CA 94002) or send electronic mail over MCI Mail to APLUS or RLOCKWOOD. And, for the time being, you can still contact me at my CompuServe account number, PPN 70210,150.

If you have something to say, let's hear from you. The fastest, easiest, and most convenient way—your Apple and modem—is right there on your desk. ✚

FURTHER INFORMATION

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(415) 591-2333
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Case Western Reserve University
School of Medicine
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Cleveland, OH 44106
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(216) 368-3888 (modem)
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Veracorp
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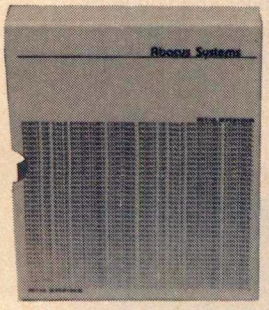

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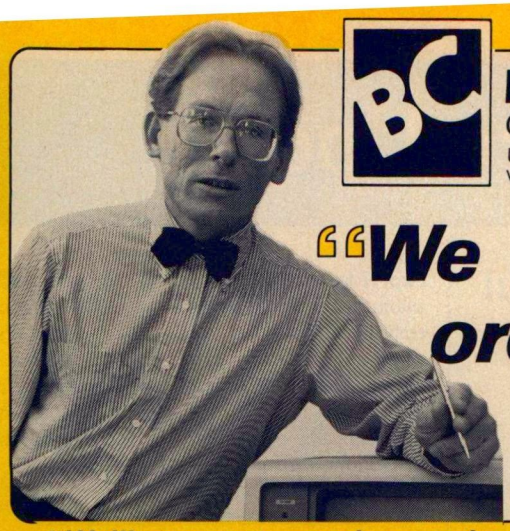

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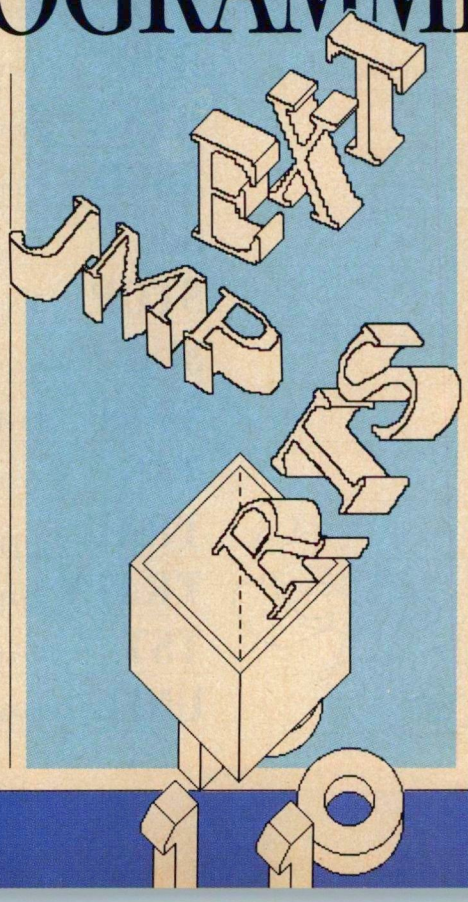
The Macintosh Section

PROGRAMMING
BY GARY B. LITTLE

PART I

68000 ASSEMBLY-LANGUAGE PROGRAMMING



This article is the first in a series of three articles designed to introduce you to 68000 assembly-language programming on the Macintosh. This month, I'm going to give a general overview of the instructions the 68000 can carry out, look at the internal registers it uses to store addresses and data, and explain how the computer uses the status register to keep track of its operational mode.

Basically, the Motorola MC68000 microprocessor (the 68000 to its friends) is the brain that controls the Macintosh. Its primary function, of course, is to run all those programs that make the Mac such a delightful computer to work with. It is also responsible for communicating with the various input/output (I/O) devices attached to the Mac—the two serial ports; the external-disk-drive port; the mouse; the keyboard; and, on the Macintosh Plus, the SCSI (Small Computer System Interface) port.

The 68000 is usually referred to as a 16/32-bit microprocessor by computer engineers because, although it has a 16-bit (one-word) data bus, it has several 32-bit (two-word) internal registers for storing data. Despite this size mismatch, you can tell the 68000 to fill an entire register by using just one instruction; when you do so, the 68000 automatically fetches two words of data. A true 32-bit version of the 68000, called the 68020, sports a 32-bit data bus, so it can fill a register in just one fetch. Macintosh-like computers that use the 68020 presently are rumored to be on the drawing board at Apple Computer.

The 68000 uses a 24-bit address bus, which means that it can directly access up to 16 megabytes—or 16,777,216 bytes—of memory! Addresses are usually referred to by six-digit hexadecimal numbers ranging from $000000 to $FFFFFF (the leading dollar sign labels the number as hexadecimal).

Most of the 68000's address space is unused on the current versions of the Macintosh, but future releases may use much more. The new Mac Plus, for example, uses one megabyte for RAM and 128K for ROM. The last eight megabytes of the address space is reserved for use by I/O control ports for peripherals.

The 68000 Instruction Set

Surprisingly, the 68000 understands only 55 basic instructions. Figure 1 includes their standard names, together with brief descriptions of what they do. Instructions are simply commands to the 68000 that tell it what to do: move data from place to place, fill an internal register with a number, call a subroutine, add two numbers together, and so on. A few of the 68000 instructions correspond closely to commands in a higher-level language such as BASIC; JSR (GOSUB), RTS (RETURN), and JMP (GOTO) are the most obvious. Most, however, involve direct manipulation of internal registers and status bits, operations that higher-level languages such as BASIC and Pascal cannot accomplish.

The instructions in figure 1 are the ones you will use to write source code

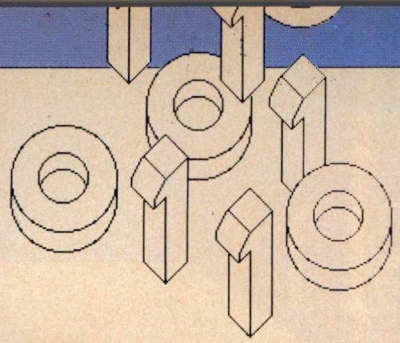
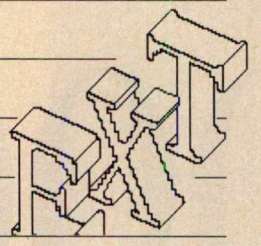
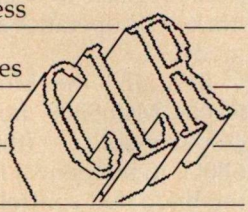
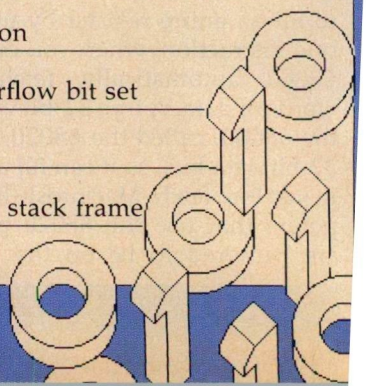


Figure1:
Instruction mnemonics for the 68000 microprocessor

ABCD	Add BCD number with extend
ADD	Add binary number
AND	Logical "and"
ASL	Arithmetic shift left
ASR	Arithmetic shift right
Bcc	Branch conditionally
BCHG	Test a bit and change
BCLR	Test a bit and clear
BRA	Branch always
BSET	Test a bit and set
BSR	Branch to subroutine
BTST	Bit test
CHK	Check register against bounds
CLR	Clear to zero
CMP	Compare
DBcc	Decrement, test, branch if condition true
DIVS	Signed division
DIVU	Unsigned division
EOR	Logical "exclusive or"
EXG	Exchange two registers
EXT	Sign extension
JMP	Jump
JSR	Jump to subroutine
LEA	Load effective address
LINK	Allocate a stack frame
LSL	Logical shift left
LSR	Logical shift right
MOVE	Move
MULS	Signed multiplication
MULU	Unsigned multiplication
NBCD	Negate BCD number
NEG	Negate a binary number
NEGX	Negate binary number with extend
NOP	No operation
NOT	One's complement
OR	Logical "or"
PEA	Push effective address
RESET	Reset external devices
ROL	Rotate left
ROR	Rotate right
ROXL	Rotate through X left
ROXR	Rotate through X right
RTE	Return from exception
RTR	Return and restore status register
RTS	Return from subroutine
SBCD	Subtract BCD number
Scc	Set conditionally
STOP	Stop execution until interrupt
SUB	Subtract binary number
SWAP	Exchange halves of data register
TAS	Test and set
TRAP	Trap exception
TRAPV	Trap on overflow bit set
TST	Test
UNLK	Deallocate a stack frame







for a 68000 assembly-language program. Since a 68000 processor (like all processors) understands only binary numbers, however, you must convert any assembly-language program you write to this computer-readable form before you can run it. One way to do so is to use the assembler and linker that come with Apple's Macintosh 68000 Development System (MDS). The executable code MDS (or any other assembler/linker) generates is called object code or machine code. I will show you how to use the MDS later in this series.

Most 68000 instructions work with one or two operands that you provide. These operands tell the 68000 where to find the data to manipulate and where to store the result. Most instructions have at least one operand, and many have two, one called a source operand and the other a destination operand.

For example, consider a two-operand instruction such as the ADD instruction:

```
ADD source_operand,dest_operand
```

As you can see, the two operands come right after the instruction mnemonic and are separated by a comma. For the ADD instruction, the operands tell the 68000 how to locate the two numbers to add together; the result is stored at the location that the destination operand describes. Next month, I'll be covering the specific types of operands you can use with the 68000.

By the way, you must be careful to specify the operands in a two-operand instruction in the correct order: The source operand always comes first. Assemblers for some other microprocessors, notably IBM PC 8088 assemblers, insist that operands be specified in the opposite order!

Programming Model

One measure of the power of a microprocessor is the number of internal registers it uses to manipulate and transfer data—the microprocessor can handle operations involving data stored in registers much faster than corresponding operations with data stored somewhere in the random-access-memory (RAM) space. With plenty of registers at your disposal, it's easy to crank up the speed of a program by using as many of them as possible for storage of scratch-pad data or intermediate results before storing final results in memory.

As figure 2 illustrates, the 68000

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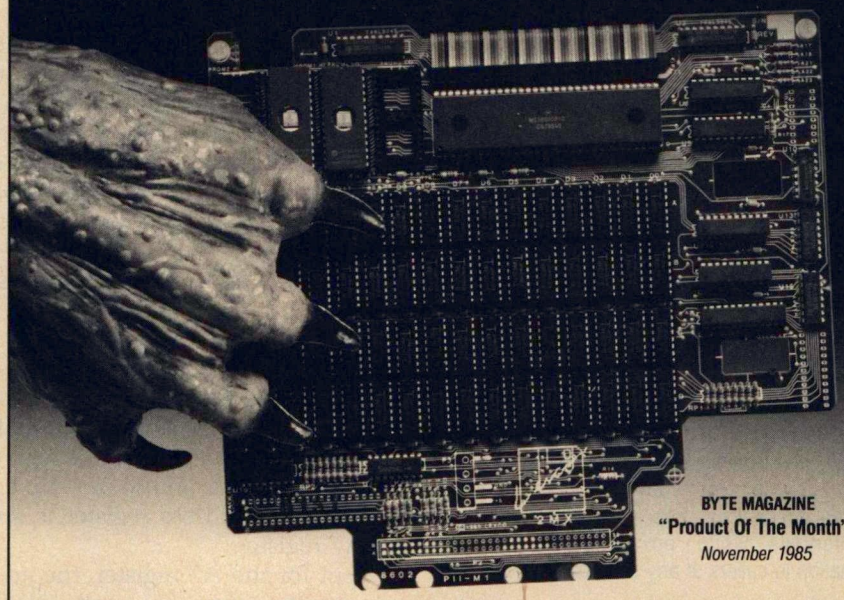

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contains several registers: eight 32-bit data registers, nine 32-bit address registers, a 32-bit program-counter register, and a 16-bit status register. Keep in mind that these registers are not RAM locations—they form part of the 68000 microprocessor itself.

The bits in a register are numbered from 0 to 31 (or 15, in the case of the status register), where bit 0 is the least significant bit and bit 31 is the most significant bit. This right-to-left numbering scheme is the same as the one that identifies bits in a byte (8 bits), a word (2 consecutive bytes—16 bits), and a long word (4 consecutive bytes—32 bits).

Let's look at each of these registers in turn.

Address Registers

Although the 68000 has nine address registers, only eight are active at any given time. The conventional names for these eight address registers are A0, A1, A2, and so on—up to A7. The ninth address register is an extra A7 register.

Except for the A7 register, the address registers can be used interchangeably, subject only to any restrictions that the Mac's operating system dictates. The A7 register is special because the 68000 uses it as a pointer to an important data structure called a hardware stack. As you'll see next month, certain 68000 instructions and even your own programs use the stack for temporary data storage. Not surprisingly, another name for the A7 register is SP (which stands for *stack pointer*).

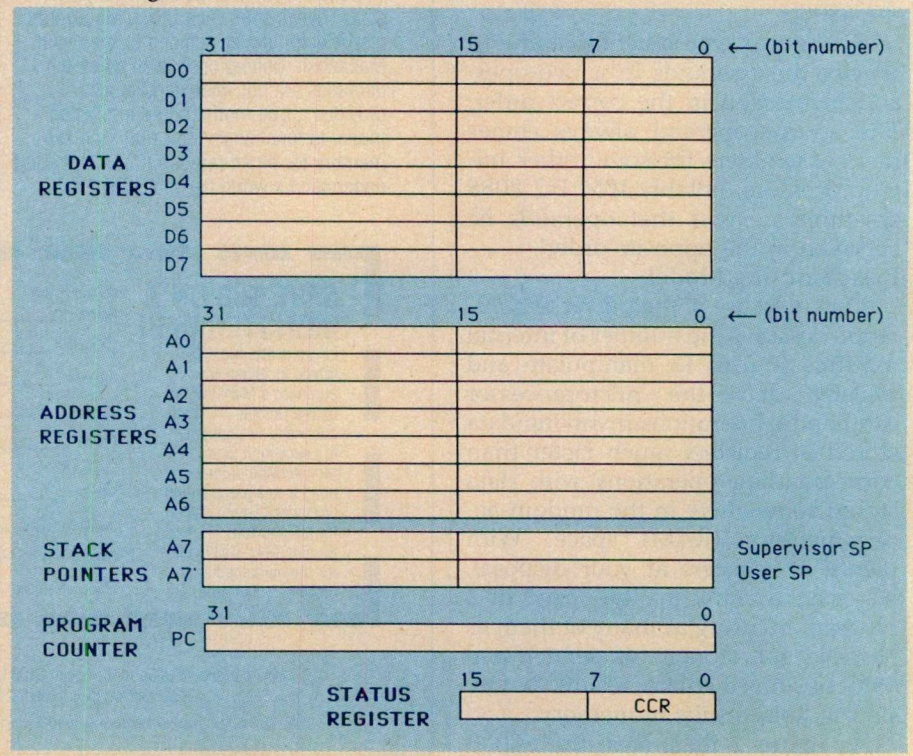
You can use the 68000 in one of two operating modes, User or Supervisor; you select the appropriate mode by adjusting the supervisor-state bit in the 68000 status register. You normally use only one of the A7 registers (the supervisor stack pointer) on the Macintosh, because you're always in the Supervisor mode. If you enter the User mode, the user stack pointer (the other A7 register) becomes active.

An address register can hold any data you care to store in it, but, as the name suggests, it usually holds the address of a data structure or variable your program uses. You can also use it as a location pointer into a data structure when you use either of the 68000's two indexed addressing modes (more on these addressing modes next month). You can store either a word (two bytes) or a long word (four bytes) in an address register, but not just a single byte.

Data Registers

The eight data registers are called D0, D1, D2, and so on—up to D7. They are logically equivalent to each other, so you can use any one of them in exactly the same way you would use any other—subject, again, to any restrictions of the operating system.

Figure 2: The 68000 register set: eight data registers, nine address registers, a program counter, and a status register



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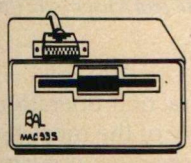

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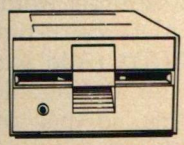

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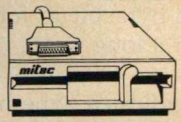

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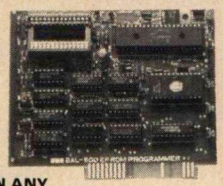

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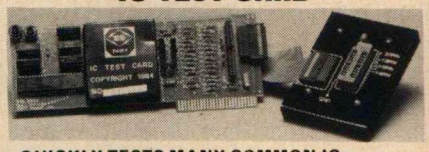

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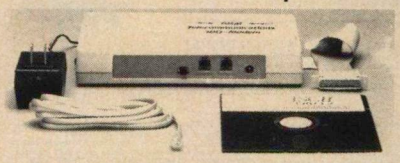

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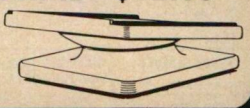

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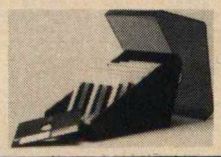

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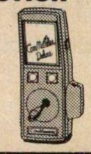

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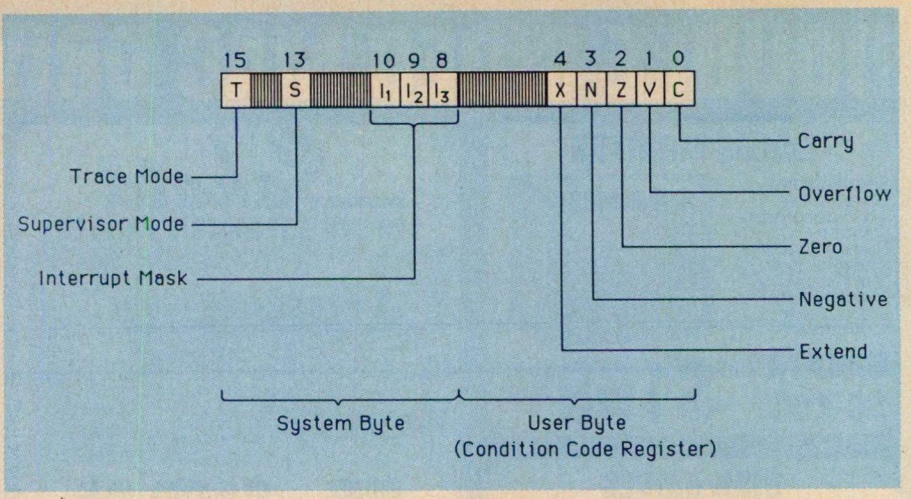

Figure 3: The 68000 status register—notice that it comprises a system byte and a user byte (the Condition Code Register). Unused bits are shaded.

Although the data registers are the same size as the address registers (32 bits), you cannot use them in exactly the same way. The main difference is that you can store long words, words, and bytes in them (not just long words and words).

Data registers are usually for storing numeric data or indexes in data structures.

Status Register

The status register (the SR), a 16-bit register that reflects the operational mode of the 68000, actually comprises two parts, the system byte and the user byte, as you can see in figure 3.

The bits in the system byte reflect the fundamental operating state of the 68000: whether it's in the Supervisor or User mode, what hardware interrupts are enabled, and whether instruction tracing is enabled. The Macintosh operating system initializes the system byte when you first turn on the computer. Few applications need to change the initial setting, so you can usually ignore the system byte altogether. In fact, I'm not going to discuss it further!

The user byte is of much more interest to programmers. It contains five one-bit condition-code flags that most 68000 instructions refer to or affect. For example, the 68000 can carry out a group of "branch conditionally" instructions (BCC, BCS, BVC, and so on) you can use to change the flow of a program based on the state of a condition-code flag. The user byte is also called the Condition Code Register, or CCR.

Extend (X)

The extend flag is primarily for indicating the carry or borrow status in an addition or subtraction operation. If it is set to 1, a carry of the most significant bit of the operand occurred during an addition operation, or a borrow occurred during a subtraction operation.

The existence of the extend flag lets you carry out multiword mathematical operations. For example, if you want to add two numbers that each occupy three words in memory, you first add the lowest-order words, using the standard ADD instruction, and then use the ADDX (Add with Extend) instruction for the middle- and high-order words, so that any carry is included in the total.

Negative (N)

The negative flag indicates the sign of the result of the last mathematical operation or of the data that was last moved into a data register. The negative flag is set to 1 if the sign bit (the most significant bit) of the result or data is 1; otherwise, it is 0. The sign bit is bit 7 for a byte, bit 15 for a word, and bit 31 for a long word.

Zero (Z)

The zero flag indicates whether the result of the last mathematical operation was zero. If it was, the zero flag is set to 1; if not, the zero flag is cleared to 0. The zero flag is not just adjusted after mathematical operations. Whenever you move a zero value into a data register, the zero flag is set to 1. If some other value is involved, the zero flag is cleared to 0.

Overflow (V)

The overflow flag is important only if you're working with signed numbers, those in which the most significant bit of the operand (bit 7 for a byte, bit 15 for a word, or bit 31 for a long word) holds the sign of the num-

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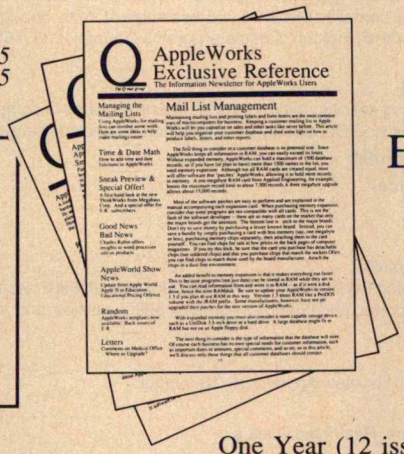

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ber (1 means negative, and 0 means positive). The rest of the bits hold the magnitude of the number in a "two's complement" form. You get the two's complement form of a number by taking the binary form of the absolute value of the number, complementing all the bits (changing 1s to 0s and vice versa), and then adding 1. This form makes internal addition and subtraction operations simpler.

If the result of a mathematical operation on two signed numbers is outside the range of numbers that can be represented in this format, the overflow flag is set to 1; if all goes well and the number is in the allowable range, it is cleared to 0. You can use the branch-conditionally instructions BVS (Branch on Overflow Set) and BVC (Branch on Overflow Clear) to pass program control to anywhere you want when an overflow condition occurs.

Carry (C)

The carry flag is similar to the extend flag. In fact, every instruction that sets or clears the extend flag also sets or clears the carry flag. The converse is not true, however, as only the carry flag is affected by certain operations. For example, most data-move-

READING LIST

M68000 16/32-Bit Microprocessor Programmer's Reference Manual, Prentice-Hall, Inc.
This book is the official Motorola guide to the 68000 and is included with the Apple Macintosh 68000 Development System.

Little, Gary B., *68000 Programming on the Macintosh*, Brady Communications, 1986.
My own book on the subject, which will be published this fall

Williams, Steve, *Programming the Macintosh in Assembly Language*, Sybex, Inc., 1986.
This massive book may seem a bit overwhelming, but it contains plenty of interesting programming examples relating to the Macintosh.

MacTutor, The Macintosh Programming Journal, P.O. Box 846, Placentia, CA 92670; (714) 993-9939).
A superb periodical geared to 68000 assembly-language programmers and others developing serious applications for the Macintosh

ment operations clear the carry flag only, and only the carry bit participates in the ROL (Rotate Left) and ROR (Rotate Right) bit-shifting operations.

Program Counter

Another important register in the 68000 is the program counter. It always holds the address of the position in a program where the 68000 is currently operating. Without the program counter, the 68000 would have no idea of what instruction to execute next. Although the program counter is a 32-bit register, the 68000 uses only the first 24 bits, since the 68000 has only a 24-bit address bus. The counter can hold any address in the 68000's 16-megabyte range.

The 68000 usually processes instructions in the order in which they appear in a program. After it has dealt with an instruction, the program counter will be pointing to the next in-line instruction. There are many ways to skip around within a program, such as using the branch-conditionally and JMP (Jump) and JSR (Jump to Subroutine) instructions. When the program flow changes with a branch or a jump, the program counter is automatically set equal to the target address the instruction's operand specifies.

The program counter is also affected by the 68000 return-from-subroutine instructions, RTS, RTR, and RTE. In each case, the 68000 removes an address from the hardware stack and puts it into the program counter so that processing can continue with the instruction following the one that called the subroutine and placed the address on the stack in the first place.

Wrapup

Next month I will be describing the addressing modes the 68000 uses to locate its operands, and the hardware stack. Until then, you may want to do some reading to become more familiar with the 68000 more quickly. I recommend the publications included in the reading list that accompanies this article. ✚

Gary Little has written four books on how to program the Apple II. He has shifted gears, and his next book will be 68000 Programming on the Macintosh, *to be published this fall by Brady Communications, Inc. Gary is also the author of Point-to-Point, a communications program for the Apple II published by Pinpoint Publishing.*

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WHEELS FOR THE MIND

Two Apple University Consortium schools demonstrate the program's possibilities.

THE UNIVERSITY MACINTOSH

BY DAVID D. THORNBURG

By now, literally millions of computers are in classrooms from kindergarden through high school. Educational applications for personal computers have become sufficiently diverse that computer technology has moved from being an object of study (as it was in early "computer literacy" courses) to being a tool for teaching and a productivity tool for students.

Educators are convinced of the computer's value. For example, Texas has mandated that every child in the state pass a computer-literacy course prior to the completion of the ninth grade. According to a survey UCLA conducted at numerous colleges and universities, well over 50% of college freshmen had taken at least a half year of "computer science" in high school, and the number increases every year.

What happens when a computer-literate high-school graduate goes to college? Are colleges and universities keeping up with the educational technology? The answer depends greatly on the college the student attends and on the student's major. Generally, colleges have lagged behind elementary and high schools in their use of educational computing, however.

Enter the AUC

In an effort to increase the utility of classroom computers at the college level, Apple created the Apple University Consortium (AUC). It gave selected campuses across the country (and now the world) access to special support and pricing on Macintosh computer systems. With this incentive, students rushed to purchase their own computers, and universities hurried to find ways to integrate personal computers into classrooms.

The challenge was great. In the K-12 arena, the curriculum is sufficiently uniform that the publishers of commercial software can create classroom programs in many subject areas.

Although this uniformity may exist for large, introductory college courses, a college teacher can't pick up a catalog from Sunburst or some other well-known educational-software house and find instructional programs to help with a course on Sanskrit poetry. Educators must also face the question of how college-level educational software will be developed and who will develop it.

Wheels for the Mind

On numerous AUC campuses the answer is coming from local groups of software developers who work closely with faculty members to develop courseware. Whenever possible, individual instructors are encouraged to become familiar with general software such as word-processing, spreadsheet, and graphics programs, and database software such as Filevision. Faculty members can turn such programs into instructional tools by using self-designed and -produced templates.

Vast opportunities exist for university-level software that requires the writing of programs from scratch. The AUC schools share information about work in this area in *Wheels for the Mind*, a publication by Peter Olivieri at Boston

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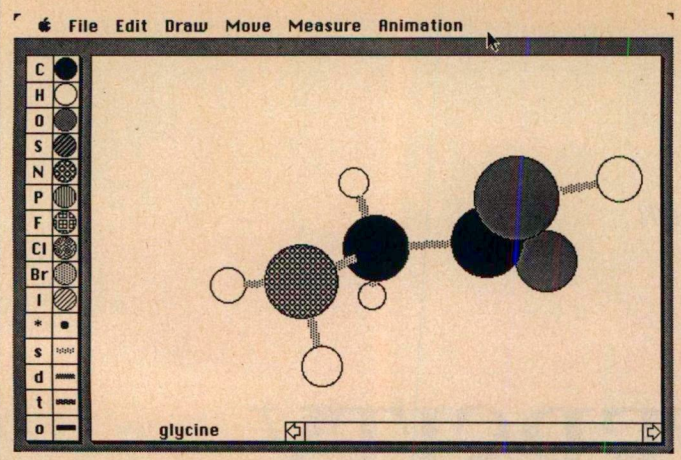

Figure 1: A typical screen from the Drexel Molecular Editor program showing one view of a glycine molecule. The program lets you construct and manipulate molecules of complex compounds.

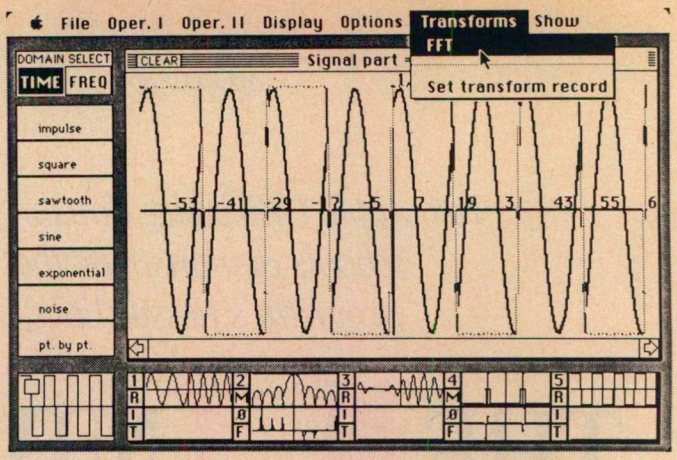

Figure 2: A screen showing the Drexel Fourier analysis program after performance of a few experiments. The results of previous computations are shown in the bins at the bottom of the screen.

College (Computer Sciences F430, Chestnut Hill, MA 02167). This journal demonstrates clearly that many schools are making up for lost time in their enthusiastic support for educational computing.

The Mac at Drexel

One of the many schools active in this area is Drexel University in Philadelphia, Pennsylvania. All incoming students buy a Macintosh at a discount or borrow one from the school for use in their dorm room. They use their computers for far more than word processing.

For instance, according to Professor Allan Smith, the Macintosh has become an invaluable ally in the teaching of chemistry. Multiplan and TK!Solver templates allow students to perform chemical-equilibrium calculations. Through Lesson-Writer, an authoring system developed by Dr. Sally Solomon, instructors can write their own tutorial software. Some examples of these tutorials are special programs to help students learn about the stereochemistry of organic compounds, the periodic table of the elements, and the kinetics of chemical reactions.

The Molecular Paintbrush

Professor Smith developed the Molecular Editor, a program that lets users create molecular models, which can be rotated and modified chemically, on the screen (see figure 1). This tool is sufficiently general that it is being used in several courses.

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Other scientific and technical applications abound at Drexel. For example, Professor Banu Onaral has supervised the creation of several signal-analysis programs designed to help engineering students become active, rather than passive, learners. These programs serve as a dynamic blackboard for illustrating hard-to-draw results of complex calculations. Students have individual access to the programs, so they can experiment with various theoretical concepts in the privacy of their own rooms.

One of Onaral's programs performs Fourier analysis and works with complex data in both the time and frequency domains. Figure 2 shows the computer screen after a few experiments. The main screen shows a Phase-Shift Key modulated signal along with the modulator signal (the dotted line).

The Softer Side of the Mac

No one is surprised that the Macintosh should find ready acceptance in the hard sciences and engineering. What is interesting is the extent to which this computer is finding use in some of the "softer" sciences such as psychology.

A Drexel program called MacLaboratory familiarizes students with the fundamentals of research in the behavioral sciences. Its main purpose is to give students an understanding of the proper application of the experimental method to behavioral problems and to give them practical experience with the kinds of things psychologists do.

Students using this program can design their own experiments and run them anywhere they want, rather than having to restrict their experience to actual lab experiments.

Access to Drexel programs is spreading to the surrounding community through the efforts of people such as Stephanie Bovoso, a nutrition major. She helped develop a program to help patients with kidney disease develop good eating habits and has used it with such patients while they are undergoing the time-consuming process of dialysis.

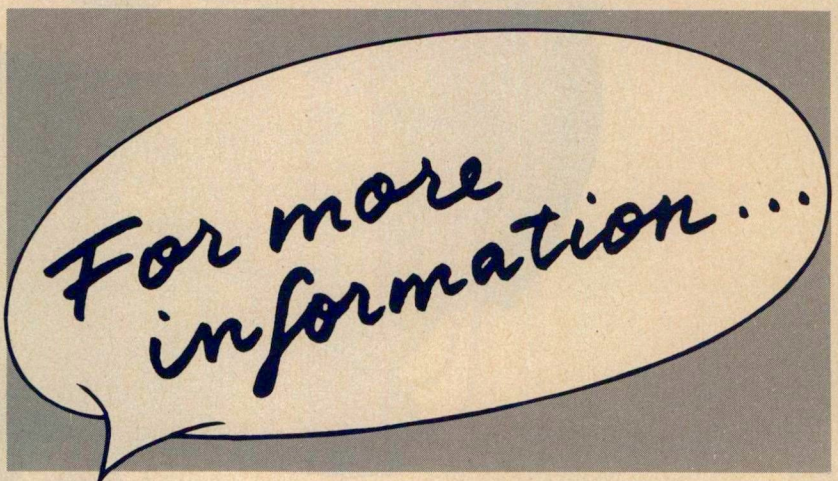
Users of this program get to see how any combination of food from a long list affects their requirements for water, protein, carbohydrates, minerals, and caloric intake.

The Stanford Macintoshes

Another of the many campuses in the AUC that has had great success with the Macintosh is Stanford University in Stanford, California. Although Stanford students are not required to buy or borrow Macintosh computers, there are several large Macintosh clusters on campus, and many students have purchased their own. I would guess that 6000 Macs have been sold to Stanford and its students since the AUC program's inception.

As at Drexel, Stanford faculty members have worked with resident software developers to create some excellent programs.

Students have individual access to the programs, so they can experiment with various theoretical concepts in the privacy of their own rooms.



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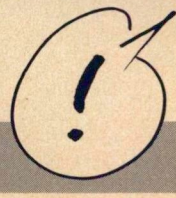

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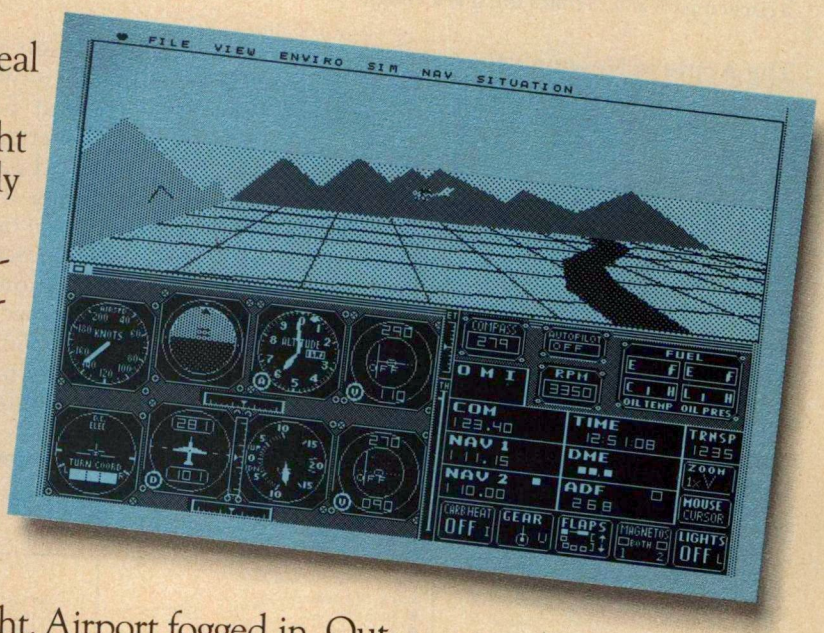

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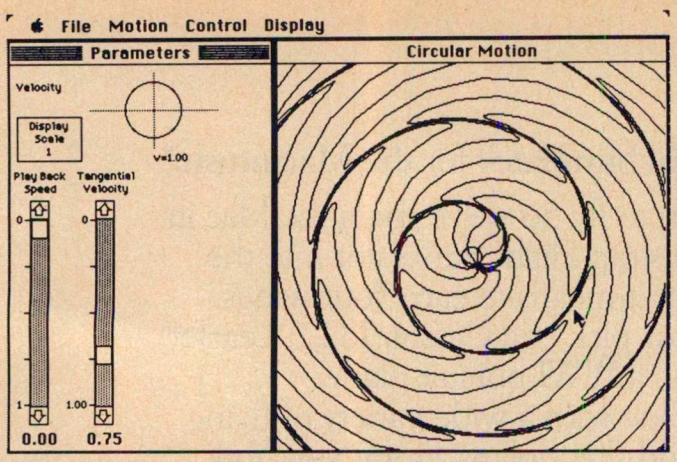

Figure 3: A view of the Stanford physics-simulation program showing synchrotron radiation from a charged particle moving in a circular path at 0.75 times the speed of light

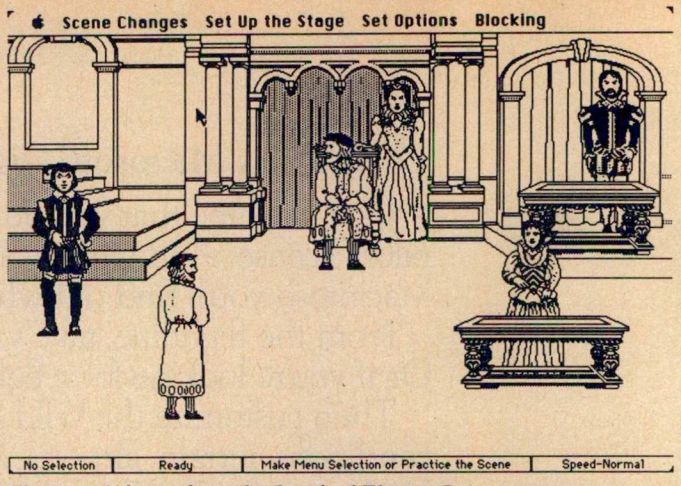

Figure 4: A frame from the Stanford TheaterGame program showing the arrangement of actors in a scene from **Hamlet.**

The Apple of Newton's Eye

Professor Blas Cabrera devised a series of simulations for use in conjunction with a one-year physics course. These simulations let students see animated results of model experiments and acquire an intuitive but accurate understanding of physical phenomena including molecular motion, atomic theory, diffraction, relativity, radiation, and others.

Each simulation is a separate program optimized for the topic being covered. In the Radiation program, for example, users can simulate the movement of a charged particle at various speeds along various trajectories. The electrical-field pattern the particle generates during its motion appears in animated form on the display screen. Because the mathematics of electrical-field calculations for particles moving near the speed of light is complex, the resultant animated sequences illustrate phenomena that are difficult to show numerically or with static pictures in a book.

Figure 3 shows a snapshot of the electrical field a charged particle moving in a circular path at 0.75 times the speed of light radiates. The particle's circular path shows near the center of the window; the expanding spiral illustrates the pulse of synchrotron radiation the particle emits as it moves. Users can take a closer look at the field near the particle path and change the velocity to any speed from zero to the speed of light.

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- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, −10 to 0.

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- On-board memory
- On-board output buffer amps can drive 5 MA
- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 MS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

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To Mac or Not to Mac . . .

One of the most visually exciting Macintosh programs developed at Stanford is TheaterGame, a project initiated by Professor Larry Friedlander of the English department. With this program, which allows "blocking" of plays on the Macintosh, students can design their own stage layout and choose the placement for various props. Then, using an interactive animation editor to move characters across the screen, they can generate a scene from a play. Each character can rotate by varying amounts, and the head of each "actor" can rotate independently of the body to make the motion more lifelike (see figure 4). The result is an animation of a scene that can be synchronized with a recording of the spoken text.

The Noble Computer

Thanks to Professor Carolyn Lougee of the Stanford history department, students can use the Macintosh as a time machine to travel to 17th-century France. Through a historical simulation called The Would-Be Gentleman, a student takes the role of a nobleman and makes economic and social decisions that are appropriate for the times. The aim is to maximize wealth and prestige over two generations. To play this game well, students can take advantage of their research into life during this period of history. Each "move" spans six months, during which the students' decisions are carried out, so they can see their results (see figure 5).

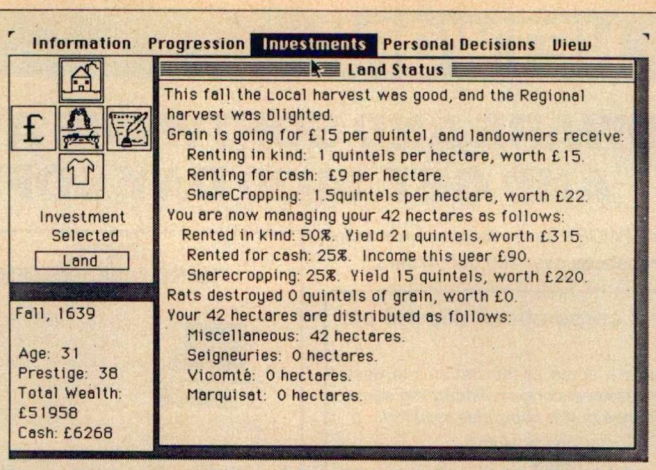

Figure 5: The status of the land held by the player of the Would-Be Gentleman, a Stanford simulation of life in 17th-century France

The Ivy-Covered Computer

At the beginning of this article, I mentioned the increasing percentage of incoming college students who already have had exposure to the computer as an instructional tool. As illustrated by the programs from Drexel and Stanford, high-quality educational software is now coming into existence for the college market as well.

The quality of education depends on human interaction, but the kinds of programs in development at the AUC schools will give humans more to interact with each other about.

Watch for further coverage of the Apple University Consortium in future issues of *A+*. +

David Thornburg teaches part-time at Stanford University and is a regular contributor to A+. He is also the designer of Calliope, an information processor for the Apple IIe, IIc, and Macintosh computers. Dr. Thornburg enjoys hearing from readers and can be reached in care of this magazine.

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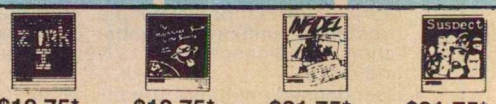

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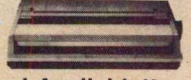

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Beneath Apple Pro DOS		16.95
Remember!		46.95
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Alge-Blaster (Davidson & Assoc)		34.95
Science Toolkit Master Module		37.95
Turbo Tutor		24.95
Sticky Bear Reading		23.99

CHECKMATE TECHNOLOGIES

Multiram IIe 64k	$ 118.95
Multiram IIe 320k	165.95
Multiram IIe 576k	205.95
Multiram IIe 768k	237.95
Multiram IIe 64k w/RGB	158.95
Multiram IIe 320k w/RGB	206.95
Multiram IIe 576k w/RGB	244.95
Multiram IIe 832k w/RGB	276.95
Multiram IIe 1 meg w/RGB	308.95
16 bit Microprocessor IIe	159.95
Multiram IIc 256k...CX	179.95
Multiram IIc 512k...CX	239.95
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CP/M RAM software	19.95
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Z-80 Plus (+/E)	105.00
IIc System Clock	65.00
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Z-80c card for IIc	114.95
16k Ram card for II+	55.95
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Disk Drive Controller IIe	67.95

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Elephant SS/SD		9.95
Elephant SS/DD		12.95
Elephant DS/DD		15.95
Verbatim SS/DD		14.95
Verbatim DS/DD		16.00
Diskettes 3 1/2 SS/DD		24.95
Diskettes 3 1/2 DS/DD		29.95
Diskette Cleaner kit 5.25		7.95
Top Notch (Disk Notcher)		9.95
Disk case (holds 10 Disks)		3.00
Diskette Carousel (holds 72) 5.25		15.95
Ring King Binder Files (holds 20)		10.95

Disk Drives

Disk Drive IIe Applied Eng.		119.00
Disk Drive Controller AE		67.95

PRINTERS

Epson LX-80		279.95
Epson FX-85 80 col		369.95
Epson FX-286 136 col		589.00
Epson LQ 1000 Ser. & Par.		709.95
Epson LQ 800 Ser. & Par.		579.95

RIBBONS

Imagewriter II Color		9.99
Imagewriter		4.15
Prowriter 8510		4.15
Epson FX/RX 80		4.15
Epson FX/RX 100		5.83
Epson LX-80		5.83
Okidata 192		6.65

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COLOR RIBBONS CALL

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Amdex 300 12"		123.00
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Color 600		399.00
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BusinessCard		145.00
Cool + Time		69.00
Grappler +		72.00
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Buffered Grappler + 16K		131.50
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Grappler C		75.00
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A-B Switch Box 36pin		99.95
Muppet Keys		44.00
Muppet Touch Tablet		75.00
Koala Pad //e - //c		75.00

HARDWARE

Trackhouse non/prog.		87.00
Trackhouse programable		127.00
UltraTerm 132 Col. (II+/IIe)		179.00
Mach III w/Fire (II+/IIe)		32.25
IIe 80Ram Card		62.95
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The Cricket //c		111.00
Thunderclock +		103.00
Disk Notcher		9.95
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MODEMS

Hayes Smartmodem 1200		360.00
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Micromodem IIe w/Smartcom I		129.00
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This chart represents the initial list of software developed by schools in the AUM. The software is being marketed through a program called the Apple Academic Courseware Exchange that sells programs for about $8 to $30 through Kinko Graphics stores, located in many college communities throughout the U.S.

CONSORTIUM SOFTWARE

PRODUCT	TYPE	VERSION	REQUIREMENTS	DESCRIPTION
Appletones Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Application:* Music	Version 2.0 5/12/85	128K	Teaches the importance of four things in the composition and arrangement of music: repetition, silence, changes in volume, and timbre
Atlas and Overlay Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Tool:* General	Atlas: 0.22 6/19/85 Overlay 1/25/85	128K	Pictorial-atlas program
Binary Trees Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Application:* Computer Science	Version 2.2 12/12/85	128K	Provides practice with binary trees, by means of graphic representations
CLR Anova Student Version Clear Lake Research 5615 Morningside #127 Houston, TX 77005 *David M. Lane*	*Application:* Statistics (particularly psychology)		512K	Analysis-of-variance program that plots interactions and computes a variety of follow-up tests
Drill Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Tool:* General	Version 2.0 5/20/85	128K	General drill program for any course in which text- and/or picture-based drill is important
Event Tutor Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Application:* Macintosh Programming	Version 1.1 5/9/85	128K	Helps programmers learn about Macintosh "events"
Huckel Molecular Orbitals Franklin and Marshall College Department of Chemistry Lancaster, PA 17604 *John J. Farrell*	*Application:* Chemistry	Version 1 3/1/86	128K, Finder 4.1 or earlier, Pascal, printer	Calculates energy eigenvalues, eigenvectors, and pi-electron charge densities using the assumptions of simple Huckel molecular orbital theory

PRODUCT	TYPE	VERSION	REQUIREMENTS	DESCRIPTION
MacSimplex University of California, Santa Barbara Department of Mathematics Santa Barbara CA 93106 *John E. Doner*	*Application:* Operations Research, Math	Version 1.62 1/21/86	128K, program to print text files: MacWrite, File, or Edit (this requirement will be eliminated in next version)	A tool for students of linear programming and linear algebra
MacVoice Carnegie Mellon University Department of Music 5000 Forbes Avenue Pittsburgh, PA 15213 *Marilyn Taft Thomas*	*Application:* Music Theory	Version 1.0, 1985	128K	Designed to assist music-theory students in writing four-voice chorales, according to the guidelines of 17th- and 18th-century practices
Mozart Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Application:* Music	Version 2.0 5/12/85	128K	Introductory music-composition program
PSI (Problem Solving Interpreter) Reed College Development Lab Portland, OR 97202 *Marianne Colgrove*	*Tools:* General Science/ Math	Version 86.03.15	128K, Finder 4.1 or higher	A simple interpretive language designed specifically for problem solving, calculations, and graphical modeling
Reed Applications I Reed College Development Lab Portland, OR 97202 *Marianne Colgrove*	*Tools:* General and Mathematics	Version 86.03.15	128K, Finder 4.1 or higher	Includes several utility, academic, and iconographic applications created with the Rascal Development System
Reed Applications II Reed College Development Lab Portland, OR 97202 *Marianne Colgrove*	*Applications:* Math, Science, Music	Version 86.03.15	128K, Finder 4.1 or higher	Includes several utility, academic, and iconographic applications created with the Rascal Development System
Skel Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Tool with source code:* Macintosh Programming	Version 2.4 5/9/85	128K	Skeleton demonstration Macintosh program to illustrate the basic code for handling a simple Macintosh user interface
The SmallGol Compiler University of California, Irvine 3018 Mountain View Drive Laguna Beach, CA 92651 *Thomas A. Standish*	*Application:* Computer Science	Version 1.0 10/1/86	128K Finder 4.1	An animated compiler
Tools for Writers Drexel University 1 Dartmouth Circle Swarthmore, PA 19081 *Eva M. Thury*	*Application:* English Composition	Version 1.1 4/1/86	128K, Finder 1.1 or higher	Allows students to perform checks and diagnostic tests on their own writing
Venn Kiewit Computation Center Dartmouth College Hanover, NH 03755 *Donald Z. Spicer*	*Application:* Philosophy	Version 2.0 5/22/85	128K	Program for teaching syllogisms and Venn diagrams in introductory philosophy courses
The Would-Be Gentleman Stanford University IRIS, Cypress Hall E-7 Stanford, CA 94305 *Barbara Jasinski*	*Application:* History/Politics	Version 4.1 3/14/86	512K recommended, MiniFinder 4.1	Historical simulation

Pipeline

MAC

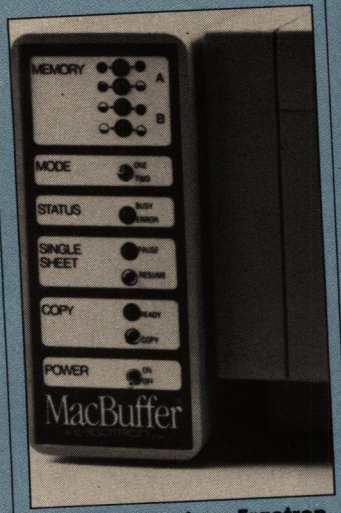
MACBUFFER

Designed for use with the Macintosh or Macintosh Plus and the ImageWriter I or II, MacBuffer is a microprocessor-controlled, hardware buffer system. The product includes a new ImageWriter driver that increases the computer's data-transmission rate to 57.6 kilobaud—six times faster than the normal rate. Other features include the ability to connect two Macintoshes to one printer, Pause and Local Copy modes, and compatibility with all existing Macintosh software. MacBuffer is available in 256K, 512K, and 1-megabyte models. *(List Price: 256K, $299; 512K, $449; 1MB, $699)*

Requires: Macintosh or Macintosh Plus, ImageWriter I or II

Ergotron, Inc.
1621 E. 79th Street
Minneapolis, MN 55420
(800) 328-9839
in MN (612) 854-9116

CIRCLE READER SERVICE NO. **501**



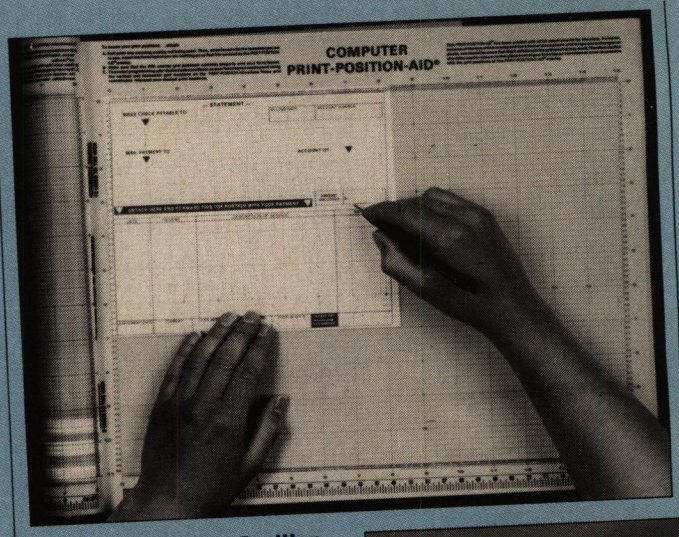
The MacBuffer from Ergotron, Inc. reduces the time you spend waiting for Macintosh printing functions.

COMPUTER PRINT POSITION AID

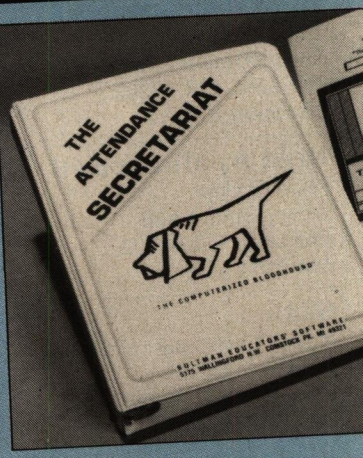
The Print Position Aid helps anyone who has to produce business forms determine the correct print positions for output. It comprises six transparent 11 × 15-inch grid overlays that can accommodate printing needs of 10, 12, or 15 characters per horizontal inch with 6 or 8 lines per vertical inch. Each grid also includes pica graduations and word-processing print spacers for 5, 6, 8.3, 16.7, 17.1, and 20 characters per inch. Users code print positions by placing a yellow cover behind the overlay they require and inserting the form or layout between the overlay and cover sheet. *(List Price: $49.95)*

Computing Aids, Inc.
P.O. Box 227
Needham, MA 02192
(617) 444-3833

CIRCLE READER SERVICE NO. **502**

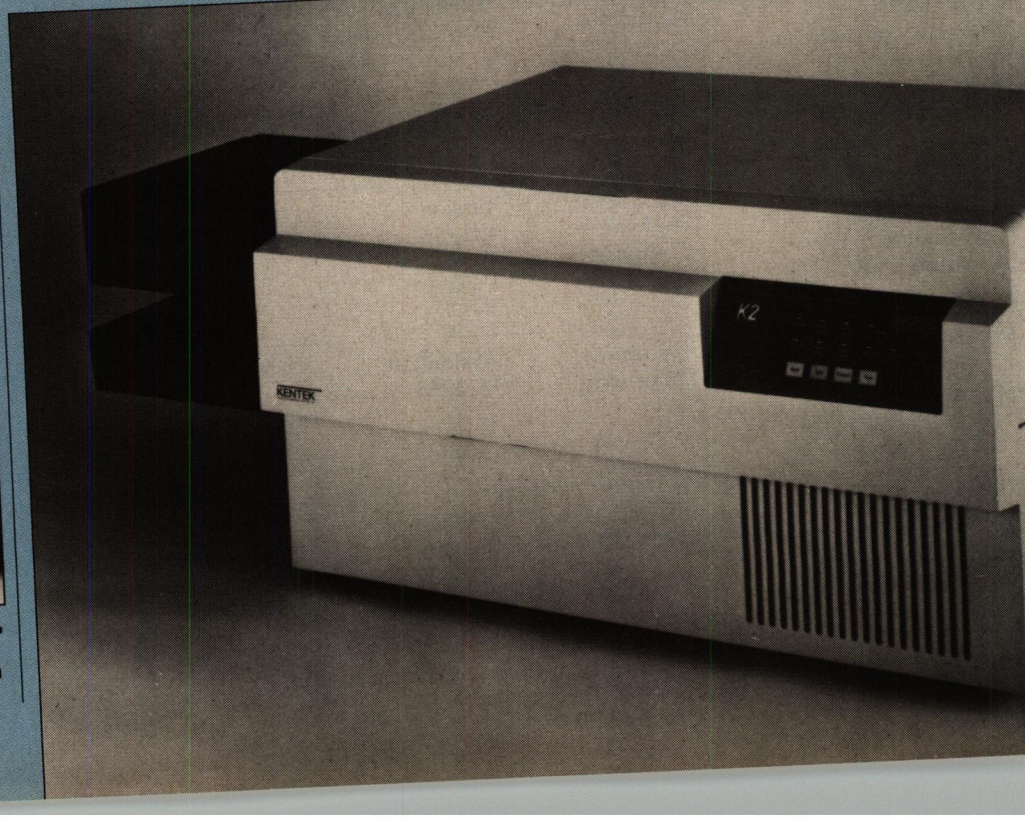


The Computer Print Position Aid (above) helps you code print positions for output on business forms. The tool comprises six transparent 11x15-inch grid overlays.



The Attendance Secretariat (right) records and manages student attendance and automatically prints a daily Absence List and Excused List report.

The Kentek K-2 inteligent electrographic printer (below) achieves a resolution of 240 dots per inch.



THE ATTENDANCE SECRETARIAT

Intended for school use, The Attendance Secretariat not only records but also manages student attendance. A Bloodhound report checks students' attendance histories each time they are absent and compares them to a user-specified pattern of unexcused and total absences. The program automatically prints a daily Absence List and Excused List report and can optionally print an Unexcused Absence List, Excessive Absence Report: The Bloodhound in up to four different patterns, and excuse slips for each teacher.

Other features include the ability to produce class, grade, and room lists and attendance summaries; to flag all athletes on daily attendance lists; to flag dates with comments; and to mark student advancement or removal at the end of a year. The program can support cycling schedules of up to eight classes, eight daily periods, and seven days per cycle. Two versions are available: an hourly version that can handle up to 1800 students and a more-limited AM/PM version. *(List Price: Hourly Version, $395; AM/PM Version, $195; three preview disks, $10)*

Requires: Apple II, II Plus, IIe, or IIc; 48K RAM

Bultman Educators' Software
5175 Wallingford NW
Comstock Park, MI 49321
Written inquiries only

CIRCLE READER SERVICE NO. **503**

The SmartCableMaker, an intelligent RS-232 interface device

SMARTCABLE-MAKER

The SmartCableMaker, an intelligent RS-232 interface device developed by IQ Technologies, is now available from IAM. The device automatically connects a computer to any peripheral equipment, such as a terminal, printer, or modem, that has an RS-232 asynchronous port. The device comes with two three-foot cables, each having both male and female connectors, and requires no external power supply or batteries. After plugging in the device, users set three switches, and the SmartCableMaker determines what signals are on each line and correctly connects data, control, and handshake lines. It then provides a graphic display of the interface configuration. A seven-position DIP switch for nonstandard applications is also provided. *(List Price: $149.95)*

IAM
P.O. Box 2545
Fair Oaks, CA 95628
(916) 961-8082

CIRCLE READER SERVICE NO. **504**

KENTEK K-2 PRINTER

The K-2 intelligent electrographic printer uses a linear array of 2048 LEDs to provide a light-source printhead that achieves a resolution of 240 dots per inch.

A built-in Motorola 68000 microprocessor controls all communications, a 1.8-megabyte bit-map generator, a 512K buffer and user RAM, a built-in 5¼-inch floppy-disk drive that provides on-line font storage, and the engine controller. A Motorola 6809 is dedicated to controlling printer operation and diagnostics.

The printer transforms text, graphics, or vector-graphics information from a host computer into a bit-mapped image, printing a first copy in 8 seconds and thereafter printing at a rate of 12 copies per minute. It comes with RS-232, RS-422, and Centronics interfaces. *(List Price: $7995)*

Kentek Information Systems, Inc.
Six Pearl Court
P.O. Box 78
Allendale, NJ 07401
(201) 825-1817

CIRCLE READER SERVICE NO. **505**

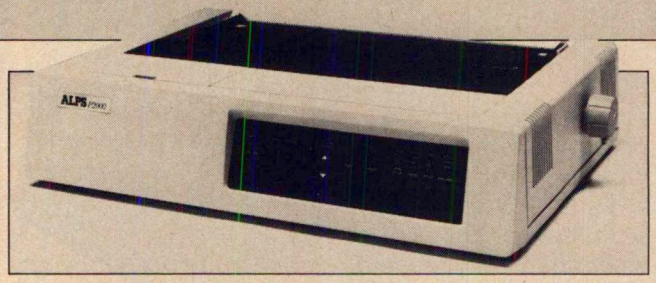
HARDWARE

II SERIES III MAC

ALPS P2000 PRINTER

The P2000 is a 136-column dot-matrix printer designed to withstand strenuous use. The 9-pin printhead offers a resolution of 240 × 144 dots per inch at each of three print speeds—250 cps for drafts, 125 cps for memos, and 50 cps for near letter quality.

The printer uses interchangeable typeface cartridges and provides a selection of pitches and more than seven variations of each typeface. It comes with a 4K buffer, expandable to 260K; both push and pull tractor feeders (an optional automatic cut-sheet feeder is also available); and an interface for Apple computers. *(List Price: $995)*



The P2000 dot-matrix printer is the first in a line of rugged business printers from Alps America.

Requires: Apple IIe, III, or Macintosh
Alps America
3553 North First Street
San Jose, CA 95134
(800) 828-ALPS
In CA (800) 257-7872
(408) 946-6000

CIRCLE READER SERVICE NO. **510**

HARD/SOFTWARE

II SERIES

EQUIDISK+

A subsystem designed for Apple II Plus and IIe computers, EquiDisk+ increases data storage to 737K on each 5¼-inch floppy disk and allows CP/M users to use foreign formats. The package includes an EquiDisk+ controller card, software, a manual, and two disk drives. The half-height drives are enclosed in a slim-line case with three AC outlets that let users control power to the computer, monitor, and printer with the system's front-mounted on/off switch. The software lets Apple users reconfigure one EquiDisk+ drive in TeleVideo format so that they can run CP/M software available for TeleVideo computers without modification. *(List Price: $679)*

Requires: Apple II Plus or IIe, 64K RAM
H&M Disk Drive Services, Inc.
1101 East Pacifico Avenue
Anaheim, CA 92805
(714) 385-1146

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CIRCLE 228 ON READER SERVICE CARD

IIc CP/M PLUS SYSTEM

Cirtech's IIc CP/M Plus System comprises a hardware module that fits inside the computer and an on-disk version of Digital Research's CP/M Plus operating system specially configured for the Apple IIc. The module contains a Z80H microprocessor for faster screen handling and does not interfere with normal computer operation. CP/M Plus is fully compatible with CP/M 2.2 but has many additional features, such as easy-to-use disk-error reporting and a help system. Additional features of Cirtech's CP/M Plus implementation include disk-formatting and copying functions, an optional blinking cursor, the ability to use the IIc mouse with any CP/M program, an invisible print spooler and keystroke buffer, and screen-dump control. *(List Price: $240)*

Requires: Apple IIc

Cirtech (UK) Ltd.
Currie Road Industrial Estate
Galashiels, Selkirkshire
Scotland TD1 2BP
44 896 57790

CIRCLE READER SERVICE NO. **519**

SOFTWARE

MACSTAR INTERFACE

Star Micronics America has introduced the MacStar II interface, a hardware/software package that enables Macintosh users to use the company's line of printers. The software portion of MacStar II modifies the computer's special printing-support programs on each Macintosh application disk. In addition, the product's print-adjustment desk accessory allows the use of each Star printer's features with the complete range of Macintosh printing abilities. *(List Price: $99.95)*

Requires: Macintosh

Star Micronics America, Inc.
200 Park Avenue
Suite 3510
New York, NY 10166
(212) 986-6770

CIRCLE READER SERVICE NO. **520**

RAGS TO RICHES UPDATES

Chang Labs has released Version 2.6 of Rags to Riches, its small-business accounting system, for the Macintosh. The double-entry accounting system comprises three modules—Ledger, Receivables, and Payables. Each module can be used alone or as part of an integrated system. Enhancements in the new version include the ability to export data to other software programs, a user-defined accounting cycle, automatic posting of recurring ledger entries, and the option to add departments and consolidation to the modules' reporting capabilities. In addition, the series now has expanded customer-statement options, improved accounting controls, expanded invoice options, and user-definable print fonts. Payables can also now print checks selectively, and each module can produce several additional reports.

The company has also introduced Rags to Riches

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IIc Mouse	99.	85.00
Numeric Keypad	99.	85.00
Ext. 80/64 Card	249.	109.00
Uni-Disk 3.5 w/Cat.	529.	419.00
3.5 Controller IIe	69.	59.00

APPLIED ENGINEERING

Ramworks II 128K	$179.	$159.00
Ramworks II 256k	219.	189.00
Ramworks II 512k	269.	209.00
Ramworks II 1 Meg	389.	289.00
RGB Option	129.	105.00
16 Bit Option	89.	79.00
Z-RAM 256K (IIc)	359.	309.00
Z-RAM 512K (IIc)	419.	349.00
Z-80 C (IIc)	159.	129.00

Z-80PLUS (II+, IIe) $139. $99.00

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- **APPLE** 2nd Uni-Disk Controller
- **APPLE** Pro Dos
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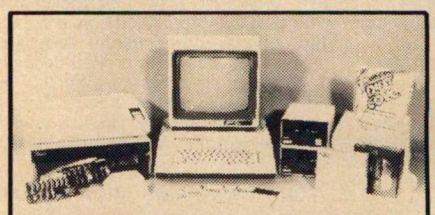

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Payroll, spreadsheet templates for the Macintosh. For a business with up to 50 employees, the spreadsheets can calculate weekly, biweekly, semimonthly, or monthly payroll; generate amounts for posting to the Ledger or Payables modules; automatically compute gross pay for both hourly and salaried employees; and calculate federal, FICA, and unemployment-insurance withholdings. Spreadsheet information can also be linked to provide quarterly and annual summaries. *(List Price: Ledger, Receivables, Payables, $199.95 each; Payroll, $39.95)*

Requires: Macintosh, 512K RAM, Multiplan or Excel (Payroll only)

Chang Labs
5300 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8020

CIRCLE READER SERVICE NO. **521**

II SERIES

CLIP ART COLLECTION, VOLUME 2

Springboard Software has released Clip Art Collection, Volume 2, a collection of business illustrations for use with its program The Newsroom. Volume 2 features a library of more than 800 illustrations in a variety of categories, including medicine, accounting, photography, audio, money, computers, realty, industry, and office. The Newsroom enables users to write, illustrate, lay out, and print newspapers, company newsletters, advertising fliers, and more. *(List Price: $39.95)*

Requires: Apple II Plus, IIe, or IIc; The Newsroom

Springboard Software, Inc.
7808 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3915

CIRCLE READER SERVICE NO. **522**

MAC

BPI GENERAL ACCOUNTING PACKAGE

BPI has introduced the General Accounting package, the first product in its Entry Series for the Macintosh. General Accounting includes three subsidiary ledgers—accounts payable, accounts receivable, and payroll. Other features include a flexible chart of accounts, six special journals plus a general ledger to record each transaction, automatic check writing, comprehensive financial reports, default options, and sample data for learning to use the system. Also available is a sales support package, the BPI Demonstration Portfolio, for marketing BPI products. *(List Price: General Accounting, $425; Demonstration Portfolio, $50)*

Requires: Macintosh

BPI Systems, Inc.
3001 Bee Cave Road
Austin, TX 78746
(512) 328-5400

CIRCLE READER SERVICE NO. **523**

AppleWorks™ Spreadsheet Printer

Turn those large AppleWorks spreadsheets around and print them down the length of the page so that you can have up to 255 characters of uninterrupted printouts. It's easy with the AppleWorks™ Spreadsheet Printer. You can use several different font sizes and even use bold face print for special emphasis. Works with Apple ImageWriter, Apple DMP, Epson MX/RX/FX, Gemini Star and other dot matrix printers. Requires an Apple //e or Apple //c. Works with either a parallel or serial interface. This is one program that no serious AppleWorks user will want to be without. Plus we've added several other useful programs for use with AppleWorks™. Comes complete with printed documentation including several helpful tips and hints on using AppleWorks. Over one thousand copies have already been sold! Order product number AW50 for only **$5.00**. Price includes shipping and handling! No hidden charges. You don't have to be a member to order. MasterCard or Visa accepted.

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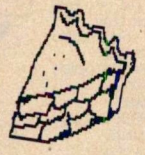

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MacTips
A+ Magazine
ATTN: Chip Carman
11 Davis Drive
Belmont, CA 94002

FINANCE MASTER

Designed to provide financial analysts with the tools to handle most business applications, the Finance Master software package comprises programs divided into three sections. First are investment applications that use various interest and annuity formulas, discounted cash-flow techniques, and a portfolio analyzer to determine the best balance between the expected gain and the associated risk. The second section deals with loans and leases, and the third section covers business-management problems, such as purchasing or leasing an asset, forecasting or fitting a trend line from historical data, and generating a random sample for auditing or selection purposes. *(List Price: $295)*

Requires: Apple II or IIe, 64K RAM, DOS 3.3, one disk drive

R&R Enterprises
P.O. Box 402
Temple City, CA
91780-0402
Written inquiries only

CIRCLE READER SERVICE NO. **552**

STRATEGIC CONQUEST

A strategy war game for the Macintosh, Strategic Conquest makes the player Commander in Chief of an army, navy, and air force whose mission is to explore and conquer a vast unknown world. The Commander must capture cities producing aircraft carriers, destroyers, fighters, submarines, troop transports, and armies.

Players must take into account such factors as production rates and counterattacks as they match wits against the Mac, which is also aiming to conquer this world. The game offers more than two billion scenarios. *(List Price: $49.95)*

Requires: Macintosh or Macintosh XL

PBI Software, Inc.
1111 Triton Drive
Suite 201
Foster City, CA 94404
(415) 349-8765

CIRCLE READER SERVICE NO. **553**

LASERFONTS

Century Software has introduced the first two font packages—Willamette and MicroFonts—in its LaserFonts series for the Macintosh computer and LaserWriter printer. The fonts work with any program that uses standard Apple LaserWriter driver software to print.

The Willamette font comes in several weights and widths that are configured to make the Macintosh and LaserWriter operate like a typesetter. The fonts include a set of printer's bullets and spaces and feature the accents and diacritical marks that you need to

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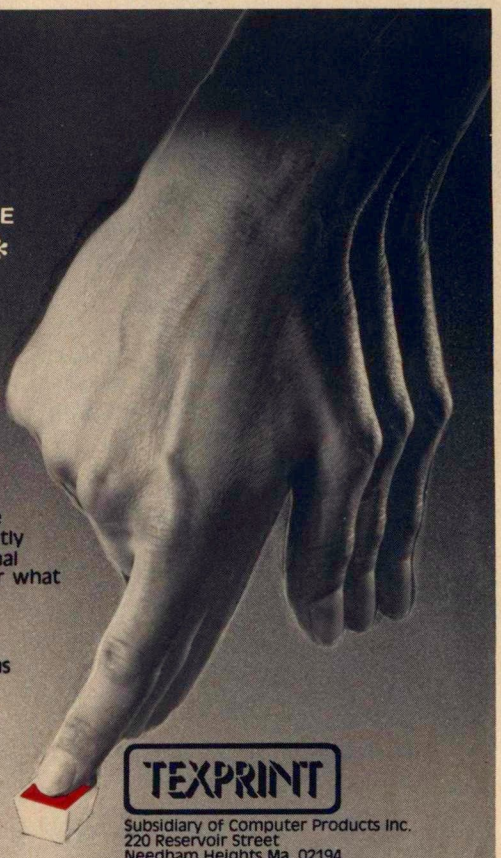

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print more than 30 languages.

MicroFonts allows you to print the LaserWriter's built-in fonts in sizes smaller than nine point. The package also lets you print condensed and expanded versions of the fonts. *(List Price: $29.95 each)*

Requires: Macintosh, LaserWriter
Century Software
2306 Cotner Avenue
Los Angeles, CA 90064
(213) 829-4436

CIRCLE READER SERVICE NO. **554**

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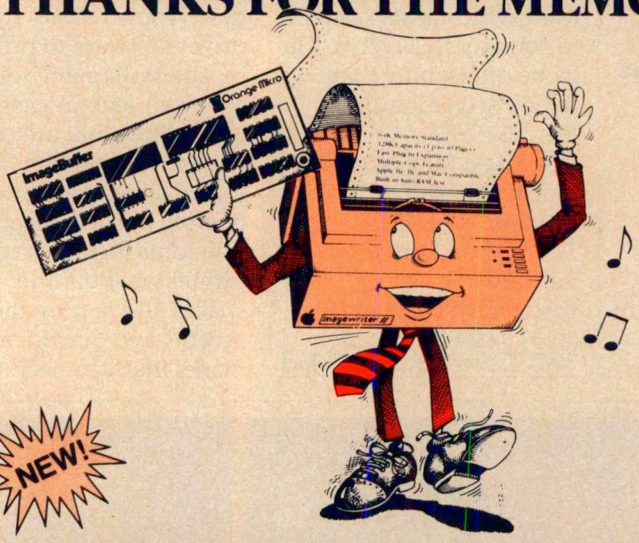

NEW!

ImageBuffer™ Makes the ImageWriter™ II Sing

Orange Micro's new ImageBuffer is the first expansion board designed for the ImageWriter II. Fitting neatly inside your printer, it provides up to 128K of buffer storage which maximizes system speed and throughput. That's up to *four times* the capacity of comparably priced buffers. And at only $99.00 list, you can have it for a song.

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Buffering saves you time. The ImageBuffer acts as a data storage tank, allowing your Apple II or Macintosh to rapidly output its print data. This enables you to quickly return to your computer, while your ImageWriter II is printing. You will never have to wait for your ImageWriter II again... even when you need multiple copies!

The ImageBuffer Advantage

The ImageBuffer is the best buffer value available anywhere. By snapping one into your ImageWriter II, you gain all these powerful features:

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- Clear Buffer Feature
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If you already own an ImageWriter II, or are planning to purchase one, don't miss out on the ImageBuffer advantage!

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CIRCLE 253 ON READER SERVICE CARD

MAC

MACINTOSH PUBLISHING SOFTWARE

Boston Software Publishers has released two new software products for the Macintosh—MacPublisher II and MacIndexer, automatic index-preparation software.

MacPublisher II converts the Macintosh into a powerful typesetting system that has full editing, layout, and page-makeup capabilities for both text and graphics. The software has a built-in text editor, offers a choice of 15 font sizes, and lets you view a full-size page as well as two facing pages. The system also features automatic kerning pairs or manual kerning, automatic page number, automatic continuation lines, repeating elements, depth justification, and the ability to position text blocks at specific screen-pixel locations. Other features of MacPublisher II include the ability to change typestyle within a line, use horizontal and vertical rulers for copy fitting, resize graphics, set type characteristics for each article, and use a zoom window to enlarge your layout.

Designed for use with MacPublisher, MacIndexer creates an alphabetical index that lists every occurrence of a selected keyword or phrase with its corresponding page number in the MacWrite document. The software includes two programs—a main application program and a Keywords desk accessory that allows you to designate keywords or phrases. You can also index every word in a document and use the Filter File option to remove any undesired words, and you can merge indexes from different documents. The software comes with the Apple Font/Desk Accessory Mover to install itself in Macintosh system files. *(List Price: MacPublisher II, $149.95; MacIndexer, $49.95)*

Requires: Macintosh or Macintosh XL
Boston Software Publishers, Inc.
1260 Boylston Street
Boston, MA 02215
(617) 267-4747

CIRCLE READER SERVICE NO. **555**

EARTHWARE SOFTWARE

Earthware Computer Services has released two educational programs. Final Exam enables teachers to create their own tests or drill programs with graphics. The program contains a drawing routine with which users can make quick line drawings, or users can create graphics elsewhere and insert them wherever they wish in the program. Final Exam can handle about 75 questions per disk, with questions being in multiple-choice, true/false, or essay format. The program comes with a master disk for creating a teacher's disk containing questions and answers; users can duplicate the teacher's disk to produce students' question disks.

Megaventure 1: Proton Quest, lets users design their own adventure games and add arcade-type action. The package contains a Designer Disk and a scenario disk; other scenario disks are available separately. The included scenario disk makes use of the players' knowledge of chemistry—players must understand chemical formulas in order to mix potions and cast spells. *(List Price: Final Exam, $29.95; Megaventure 1, $39.95; scenario disks, $20 each)*

Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive; joystick

Earthware Computer Services
P.O. Box 30039
Eugene, OR 97403
(503) 344-3383

CIRCLE READER SERVICE NO. **558**

E/G WORD, E/G BRIDGE

Sensei Software Company has released E/G Word, a professional-quality Japanese word processor, and E/G Bridge, a companion program for entering Japanese text into existing Macintosh applications. Both programs provide the complete kana and kanji fonts of the JIS Level 1 character set, a 35,000-word kanji dictionary, and extensive text- and document-formatting commands. *(List Price: E/G Word, $299; E/G Bridge, $179)*

Requires: Macintosh, 512K RAM, one disk drive

Counterpoint Systems
P.O. Box 1685
Cambridge, MA 02238

CIRCLE READER SERVICE NO. **549**

FILEFINDER

FileFinder, a desk accessory for the Macintosh, lets users manage files while they are working within an application. Its four commands—Copy, Delete, Rename, and Get Info—enable users to save time when they back up or delete files, as they need not quit their application and return to the Finder. FileFinder includes Apple's Desk Accessory Mover for easy installation in the System file; once installed, it is always available in the apple menu. *(List Price: $24.95)*

Requires: Macintosh

Nashoba Systems, Inc.
175 Sudbury Road
Concord, MA 01742
(800) 842-4250
in MA (617) 371-2029

CIRCLE READER SERVICE NO. **559**

SnAPP 2.0 EMS

The SnAPP 2.0 EMS (Electronic Messaging System) is an electronic-mail/bulletin-board system that users can customize by creating almost all prompts, menus, commands, and messages. The messaging system can contain up to 15 private or general-access message sections, an electronic-mail facility, and a library of up to 99 text files. The E mail facility provides options for registered or private mail and the ability to save mail. The system provides three levels of access—Public, Special, and Sysop—and it also has an easy-to-use editor and a detailed user-logging ability. *(List Price: SnAPP 2.0, $39.95; SnAPP Utilities, $19.95)*

Requires: Apple II Plus or IIe, 64K RAM, two disk drives or hard-disk drive, Apple-Cat or Hayes-compatible modem, ProClock

SnAPP Systems
P.O. Box 2323
Orange, CA 92669
(714) 532-6800

CIRCLE READER SERVICE NO. **560**

ANIMATED MATH MAGIC

Animated Math Magic is a math-drill program that features color, animation, and music. The program offers drill in addition, subtraction, multiplication, and division in whole numbers, fractions, and decimals. It also supports powers and roots. Multiple players can use the program to provide a competitive atmosphere, and its Handicapping feature can equalize players' experience.

Users can change functions without changing the order of play, scores, or number range of the set. Right answers summon a friendly wizard; wrong answers upset Reggie the Robot, who chases the red-faced wrong numbers from the screen. *(List Price: $29.95)*

Requires: Apple II Plus, IIe, or IIc

Texas Software
10165 Calder
Beaumont, TX 77706
(409) 866-9765

CIRCLE READER SERVICE NO. **561**

FOR YOUR NEXT ADVENTURE

Designed for ages 6 through adult, FOR Your NEXT Adventure uses an adventure-game format to teach students about arrays and how to use FOR . . . NEXT programming statements to read, write, and search arrays. The game takes students on a mission through the five floors of the Robot Corporation Building. To overcome the obstacles they encounter, students experiment with simple FOR . . . NEXT loops on the lower levels and work with more difficult concepts, such as programming with nested loops, on the higher levels. *(List Price: $59)*

Requires: Apple II, II Plus, IIe, or IIc; 48K RAM

Sunburst Communications, Inc.
39 Washington Avenue
Pleasantville, NY 10570
(800) 431-1934
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(914) 769-5030

CIRCLE READER SERVICE NO. **562**

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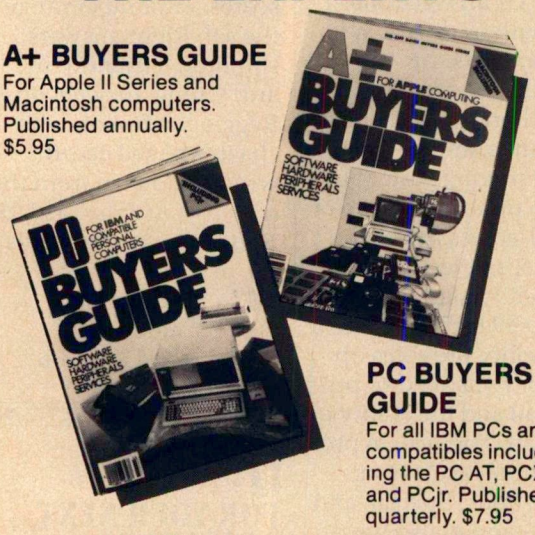

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AN41

Pipeline

MAC IIe SERIES

MINDSCAPE SOFTWARE

Mindscape has released two new programs—Balance of Power for Macintosh computers and a version of its game Shadowfire for Apple II computers.

A program in Mindscape's Alert line of recreational software for teens and adults, Balance of Power asks users to explore the question "How can nations live and compete in a confrontational world without causing nuclear war?" The game is for one or two players and has four levels of play. Players assume the role of either the president of the United States or the general secretary of the Soviet Union for a fictional eight-year period. The goal is to enhance their country's prestige and avoid war. To help players make decisions, the game includes a great deal of information about the 62 nations represented.

Shadowfire features colorful, high-resolution graphics and picture-based commands. The game is a space adventure in which six superhero-style characters must beam aboard an alien spacecraft, locate and rescue a kidnapped ambassador, apprehend the aliens' leader, and capture or destroy the alien craft. A Game Changer disk that allows users to create new scenarios is also available by mail order. *(List Price: Balance of Power, $49.95; Shadowfire, $29.95; Game Changer disk, $9.95)*
Requires: Balance of Power—Macintosh; Shadowfire—Apple II, II Plus, IIe, or IIc

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667

CIRCLE READER SERVICE NO. **550**

Shape Shop enables programmers to produce bit-mapped shapes for use in application programs.

IIe SERIES

SHAPE SHOP

Shape Shop is a tool for graphic artists that is designed to enable programmers to produce bit-mapped shapes for application programs. Two shop sizes are available—4 bytes by 32 lines and 6 bytes by 42 lines—and each contains an Editor, Db screen, Anim screen, and Cutting Board. The Editor allows full control of every pixel and color bit and has special features, such as four-way insertions, flip, rotate, and outline. The Db screen allows users to scroll through 128 shapes stored in an 8 × 16 matrix. The Anim screen enables users to test animation sequences, and the Cutting Board lets them resize shapes. *(List Price: $55)*
Requires: Apple II Plus, IIe, or IIc; 64K RAM

the dynamic arts
1666 Manitoba Drive
Sunnyvale, CA 94087

CIRCLE READER SERVICE NO. **551**

ELECTRONIC ARTS' GAMES

Electronic Arts has released several new games.

Tales of the Unknown: The Bard's Tale is a fantasy/role-playing game that has scrolling full-color dungeons and animated monster illustrations. Players must vanquish the evil wizard Mangar, who has cast an eternal-winter spell on the town of Skara Brae.

To do this, they can create up to six alter-ego characters, one of whom is the Bard. The game provides ten character classes and six races for creating characters; all characters have special attributes that affect their combat, magic, and exploration abilities. Players outfit their characters with armor, weapons, and magic items and then lead them through the game's 16 levels of increasingly complex mazes. The game features four types of magical power—conjuring, magic, sorcery, and wizardry—and various spells. An option allows players to use characters they have created in Ultima and Wizardry fantasy games.

The company has also released three new games—Ultima IV: The Quest of the Avatar , Moebius, and Autoduel—from Origin Systems, for whom it is now sole distributor.

Moebius takes the Ultima-style adventures into a martial-arts setting. In the game, players must recover a magical orb that a renegade warlord is using to upset the harmony of the island kingdom of Khantun. On their quest, players can use martial arts, swordsmanship, magic, and prayers against ninja-like assassins, rebel guards, and wild animals. The game features 3-D graphics depicting karate and sword-fighting sequences, as well as magic and character interaction; two kinds of magic; and four planes of increasing difficulty.

Autoduel is a fast-paced, futuristic strategy/role-playing game based on the board game Car Wars. The game takes place on the freeways of the future. To complete their mission, players must find clues hidden among 16 cities and miles of outlaw-infested roads. Rather than building characters, they build customized vehicles complete with weapons, armor, power plants, suspension, and body style. Winning involves road experience, gambling skills, strategic ability, and the hottest car. *(List Price: The Bard's Tale, $44.95; Ultima IV, $59.95; Moebius, $59.95; Autoduel, $49.95)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171

CIRCLE READER SERVICE NO. **527**

NEWSLINE COMMUNICATOR II

The Newsline Communicator II (NLCII) is designed to link a school's Apple IIe to a local newspaper's editorial computer system so that journalism students can create a school newspaper on the Apple IIe and then transmit the data to the local

MS - 1000-A

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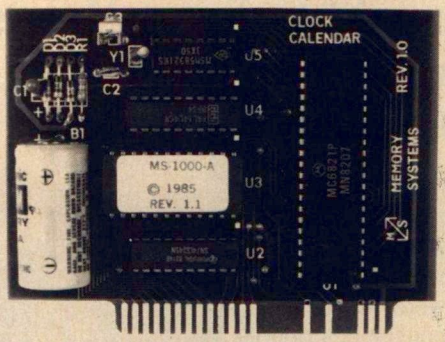

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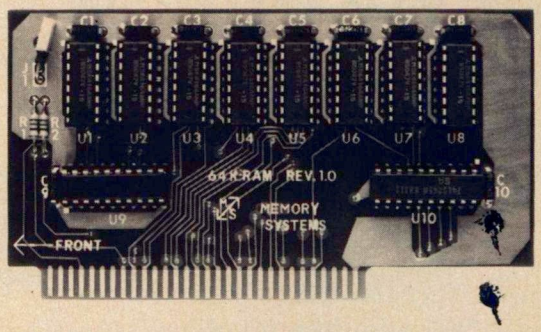

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ATTN: Chip Carman
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Pipeline

newspaper office for printing. The package includes the NLCII transmitter software, the Auto-Receiver program, and an RS-232 modem cable. The NCLII software can communicate with ten different systems and can transmit up to 100 text files in a single transmission to a host system. The Auto-Receiver runs 24 hours per day and is designed to receive ASCII text data from any other type of computer system. *(List Price: $695)*
Requires: Apple IIe, DOS 3.3 or ProDOS, Super Serial Card, 80-column card, two disk drives, modem
Switch & Mux, Inc.
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MAC

PROANALYSIS

An easy-to-use program for real-estate-investment analysis, ProAnalysis can perform advanced tax calculations, including depreciation recapture and amortization of loan points. It can also calculate multiple loans of almost all types and subcategory depreciation; forecast income, expenses, and resale value; and provide an analysis period of up to 15 years. The program allows thorough property definition, with up to 200 input variables, and its Comparison Analysis feature enables users to produce ten types of printouts for "what if" analyses. ProAnalysis also features on-line help boxes; the ability to view results on-screen; and the ability to transfer data directly to other applications, such as spreadsheets or word processors. *(List Price: $295)*
Requires: Macintosh 512K
Techanalysis Services
14555 DeBell Road
Los Altos Hills, CA 94022
(415) 948-7334
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MAC

ASSIMILATION SOFTWARE

Assimilation has introduced two new application programs for Macintosh computers.

Mac • Spell • Right, a powerful program that checks your spelling automatically when you are working with MacWrite, is available in an upgraded version. The program now includes a revised dictionary containing the most commonly misspelled words; most commonly used words; and business, technical, and professional terms. The program has a 40,000-word dictionary and a 15,000-word thesaurus; you can also create your own dictionary. A new Spell/Edit feature allows you to create, edit, count, delete, and transfer words between the Mac • Spell • Right dictionary and your own.

The second program is a spelling checker, The • Right • Word, for use with such programs as Microsoft Word, MacPublisher, and MacWrite and Jazz text files. The program automatically checks spelling and also gives alternate word choices. You can either use its 40,000-word utility dictionary with your disk drive or a full dictionary of more than 2,000,000 words with a hard-disk system. You can also create your

own document dictionary, edit it, transfer words between dictionaries, and add up to 1000 words of your own. *(List Price: $89 each)*
Requires: Macintosh
Assimilation, Inc.
20833 Stevens Creek Blvd.
Suite 101
Cupertino, CA 95014
(800) MAC-5464
in CA (800) 421-0243
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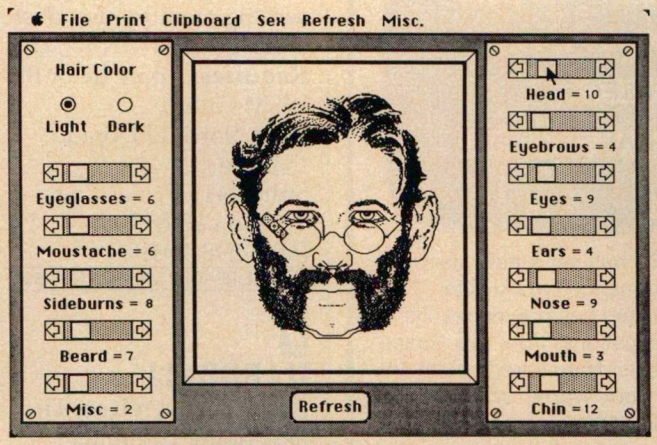
MAC

MAC-A-MUG

By scrolling through the construction set Mac-a-Mug, users can automatically compose thousands of detailed, realistic, composite human faces. The two-disk set includes both male and female facial features and accessories. Users can control every aspect of face creation, including hairstyle and color, wrinkles, blemishes, and hats. They can then print out faces in different sizes or copy them into MacPaint to refine them further. As well as additional feature libraries, a professional hard-disk version will soon be available for police-artist applications. *(List Price: $59.95)*
Requires: Macintosh 512K
Shaherazam
P.O. Box 26731
Milwaukee, WI 53226
(414) 442-7503
CIRCLE READER SERVICE NO. **531**



Mac-a-Mug from Shaherazam lets users compose realistic, composite human faces.

II SERIES

C++. COMPILER

A productivity tool that is compatible with C standards set by Kernighan & Ritchie, the C++ Compiler includes an assembler with extensive macro facilities, an overlay linker, debugging tools, runtime libraries, and a full-screen text editor. The product also includes demos, a users' manual, and library source code and has dual-mode output—native code for speed or interpreted code for con-

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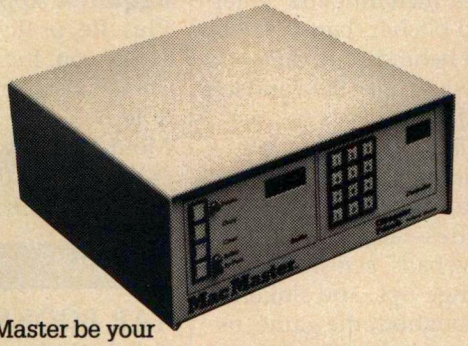

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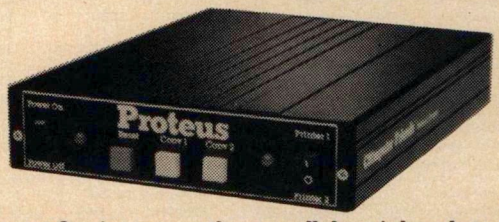

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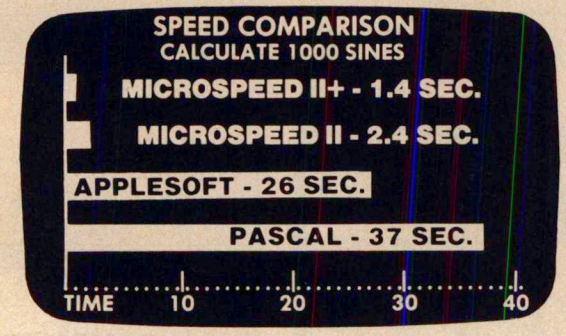

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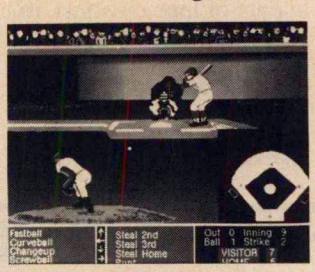
HARDBALL

Accolade has released a new home-computer baseball game, Hardball, which features movielike graphics and true-to-life animation. The game



Screen graphics from Hardball, a home-computer baseball game

shows 3-D field perspectives, including the center-field pitcher/batter view, and behind-the-plate views of right field and left field.

Either a right- or left-handed pitcher can throw up to six different pitches—fastballs, sliders, curveballs, screwballs, change-ups, and sinkers. Throughout the game, users can make management decisions, such as intentional walks, substitutions, bunts, base stealing, and infield/outfield positioning. *(List Price: $29.95)*
Requires: Apple II, II Plus, or IIe; joystick
Accolade, Inc.
20863 Stevens Creek Blvd.
Cupertino, CA 95014
(408) 446-5757
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LITTLE COMPUTER PEOPLE RESEARCH PROJECT

Activision has released a commercial version of its laboratory computer software used in its Little Computer People Research Project. The product is based on a 2½-story house-on-a-disk that lures Little Computer People (LCP) and on which they take up residence. Computer owners are responsible for providing food, water, and attention to their LCP. The software comes with a *Care and Communications Guide*; a Deed of Ownership that enables owners to register their LCP house and become official members of Activision's Research Project; and a special edition of *Modern Computer People* magazine, which details the history and culture of the LCP. *(List Price: $39.95)*
Requires: Apple II, II Plus, IIe, or IIc
Activision, Inc.
2350 Bayshore Frontage Road
Mountain View, CA 94043
(415) 960-0410
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BOOKS

TAB BOOKS

Tab Books has released five new books of interest to Apple-computer users.

Mastering the 68000 Microprocessor, by Phillip R. Robinson, provides an in depth analysis of 16/32-bit CPU chips, covering Motorola's advanced 68000 family—the 68000 68008, 68010, and 68020. The 256-page book is an ideal reference for both

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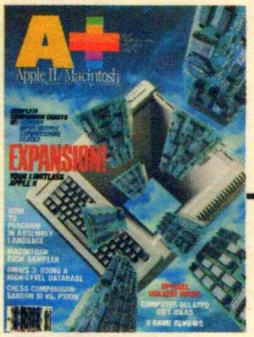

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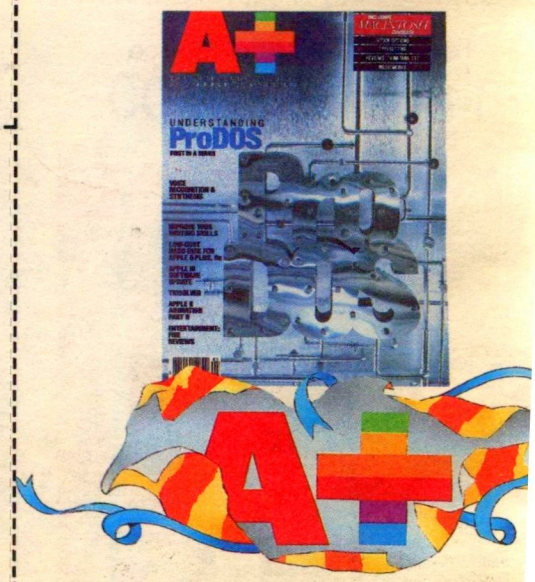

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hardware designers and assembly-language programmers, providing a complete breakdown of the 68000 architecture and a full analysis of the 68000 instruction set. Putting his emphasis on the 68000's software aspects, the author also explains currently available packages and applications and provides detailed references for chips, computers, and information sources.

The Quadram Connection, by Robert J. Traister, is a 256-page source book for Quadram's line of add-on devices. The book provides advice on choosing peripherals, comprehensive reviews of each peripheral's abilities, and detailed data on installation and operation.

The 192-page handbook *From Flowchart to Program*, by Richard G. Todd, teaches users how to break down a program logically and use flowcharts to structure programs. The author presents a variety of flowchart formats and includes review questions at the end of each section. The second part of the book covers structured programming techniques, including the use of Program Design Language (PDL) and subroutine structure. The book's final section deals with the use of special-purpose flowchart symbols.

JAZZ!, by David Bolocan, introduces Macintosh users to Jazz's advanced capabilities—word processing, spreadsheet analysis, database management, communications, and business graphics. Each topic is covered in easy-to-digest segments for easy reference. The 304-page book explains how to install Jazz, and deals with fundamental commands and application possibilities, as well as covering the codes, pull-down menus, windows, and icons that the Fat Mac uses.

Finally, the company has released the second edition of Howard Parmington's *Making Money with Your Microcomputer*. This 208-page book contains practical, proven suggestions for making money at home using a personal computer. It has details about more than 30 computer-based services, from humorous/personal services to more serious business and technical ones.

The author explains how to put ideas into action, from setting up an office and advertising services to making business contacts and locating the best market. *(List Price:* Mastering the 68000 Microprocessor, *$16.45 paperback, $22.95 hardbound;* The Quadram Connection, *$15.45 paperback, $23.95 hardbound;* From Flowchart to Program, *$12.45 paperback, $19.95 hardbound;* JAZZ!, *$17.45*

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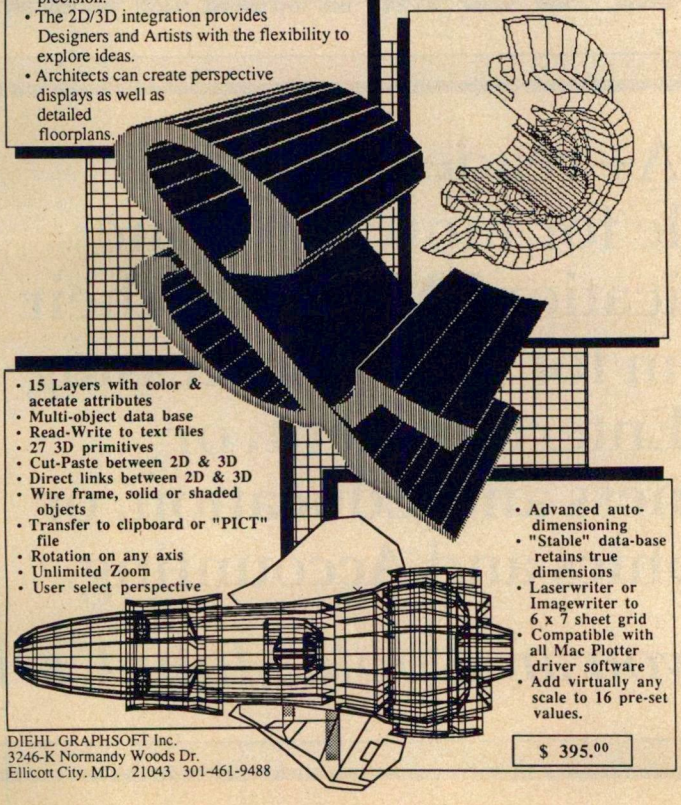

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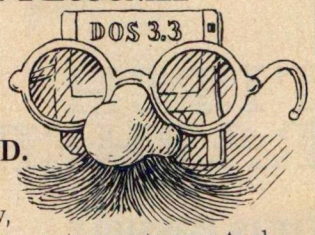

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Suncom has released two new products—The Notcher and the Wet System Disk Drive Head Cleaner—in its Disk Care line of computer accessories. Both products are designed for use with 5¼-inch floppy disks. The Notcher punches a notch on single-sided disk jackets in the location reserved for write-protect notches on double-sided disks and so makes single-sided disks double-sided. Although not intended for primary data storage, the disk's second side enables users to make backup copies of data disks. The Wet System Disk Drive Head Cleaner removes the particulate matter, smoke residue, dust, and corrosion that build up on disk heads. *(List Price: The Notcher, $9.95; Disk Head Cleaner, $7.95)*
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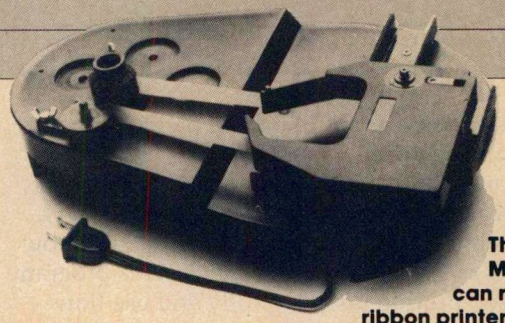

The Universal Mac Inker UC can re-ink fabric ribbon printer cartridges.

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BY STEVE ROSENTHAL

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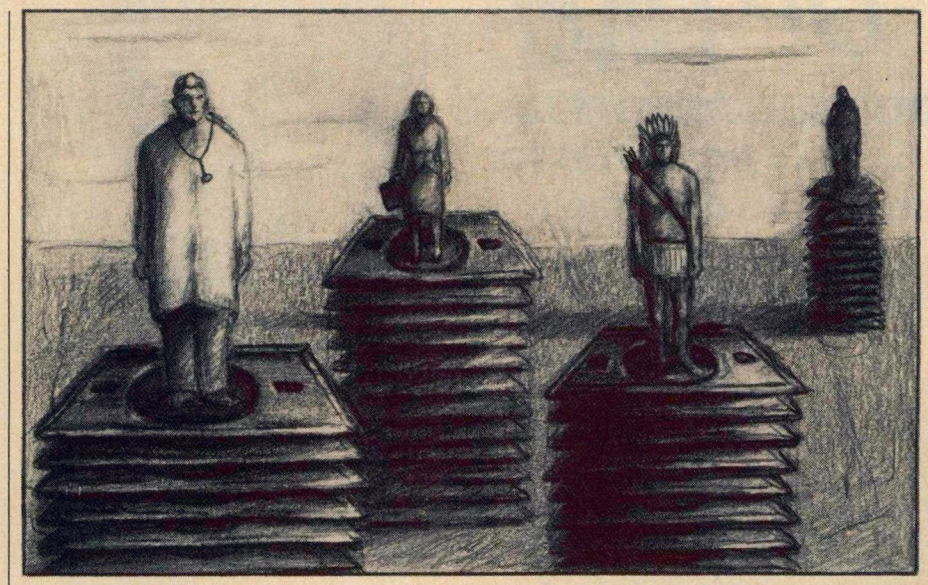

It takes years of training for a person to become a specialist, but only a quick change of a disk for a computer. That's why an ordinary Apple II or Macintosh can help out with tasks from accounting to zoology, using the procedures and vocabulary appropriate to the application.

So-called vertical-market software—programs tailored to the special needs of a particular industry or line of work—may not have the mass appeal of the more horizontal approaches that aim for the common activities of most every type of business, but it's a large and growing field. Almost by definition, the majority of us don't see the vertical packages outside of our own areas of activity, and much of the distribution is by routes other than visible outlets such as retail stores.

Range and Domain

Because so many vertical packages are byproducts of a custom effort or a private preoccupation, the usual forces that assign capital and effort to the best prospects and most widely needed programs don't always have a decisive effect. As a result, along with software for popular occupations such as dental-practice management, educational-test scoring, and real-estate appraisal, you'll also find some fairly esoteric products.

The other day, for example, I was looking for a mundane item in the *A+Buyer's Guide* (produced by the same firm that owns *A+* magazine), when I spotted a program that "determines the minimum pipe sizes for the branch lines and cross mains of a Xmas tree fire sprinkler system." Now that's a job that I don't personally expect ever to do, but if I did, I might want to check with MC 2 Engineering Software to see whether it would be worth my while to let an Apple II do most of the work. Similarly, Sycla Corporation is advertising a "helical spring design program for compression, extension and torsion springs" in the back pages of *A+*. If that's what you need, there it is.

It takes years of training for a person to become a specialist, but only a quick change of a disk for a computer.

I've also noticed that not just the number but also the diversity of Macintosh titles is growing. As you might expect, the Mac's visual interface makes it attractive to developers who are targeting the computerphobic and the inexperienced as their market. On the other hand, for someone who isn't a full-time, hotshot programmer, the Mac is a more difficult computer for which to write than the simpler Apple II series.

Just for a rough estimate, I took a look at *The Macintosh Product Availability Guide* (published by .MENU in Fort Collins, Colorado [800] MACMENU), which lists only products that companies are actually shipping (leaving out the announcements and fond hopes that often find their way into catalogs with longer lead times). It's true that horizontal categories such as word-processing support go on for more than a page, but some vertical areas such as industrial design are already over the half-page mark.

ILLUSTRATION BY STEVE DININNO

Eventually, of course, computerized "expert systems" that know about various areas of human endeavor will help do more than clerical work. Most programs right now are pretty much limited to numerical calculations, storing and retrieving data, printing reports, and repeating procedures by rote. Until computerized colleagues come along, however, having a tireless assistant that knows the business and is willing to put in a full day's work is a sufficiently good start.

Some companies specialize in tracking vertical software.

Most vertical-market software is literally somebody's codified solutions. If you look down a list of vertical-market developers, you'll see that most are primarily in some other line of business or are acting as agents for someone who is—a firm wrote the program to solve its own problem first, and distribution was an afterthought.

One result of that legacy is the unevenness of the quality of vertical-market software. Some of the packages are brilliantly done, flexible, powerful, and well documented. Too many, however, are still closely tied to the particular circumstance of the program author, with little customer support and worse documentation.

Furthermore, getting much independent information about a particular package is sometimes difficult. General-interest computer magazines don't dedicate much space to narrow-interest software packages; local dealers don't want to stock packages with limited market appeal; and specialized suppliers may not have the necessary computer expertise.

Fortunately, some companies do specialize in tracking vertical software or distributing information about product availability. At most places where you can buy computer magazines, you can also find magazine-style buyers' guides (including the *A + Buyers Guide*, from Ziff-Davis in New York; *The Macintosh Buyers Guide* from Redgate Communications in Vero Beach, Florida; *The Macintosh Product Availability Guide* from .MENU in Fort Collins, Colorado; and so on).

Many of the larger bookstores with computer sections carry annual directories, but some of the more comprehensive volumes are best obtained directly from the publishers. For example, International Computer Products in Indianapolis, Indiana, produces the *ICP Software Directory for Microcomputer Systems* with a full volume entitled *Specialized Industry Applications*, and firms such as Data-Pro and Data Sources include vertical software as part of their directories, reports, and subscription services. If you want to get information electronically, some of the services that publish directories will do a search through their database for you, either for quite a reasonable charge or, in some cases, for free if you're placing an order. You can also do your own searching on-line—most of the information utilities such as The Source, CompuServe, BRS, and Knowledge Index have product or software data bases that you can search at the utility's usual rates.

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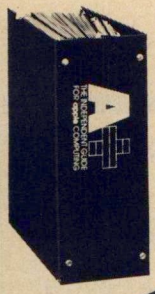

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make them particularly good vertical-market machines. The Apple II is easy to program, with an extensive array of languages, support tools, and collected lore and wisdom. For some applications, it may be underpowered in the chip department, and its floppy disks are a bit on the modest size for database storage, but the approachability of the machine outweighs the limitations for most uses that don't place outsized demands on the hardware.

The Mac also is so convenient that many developers won't consider any other machine for vertical-market applications. With the Plus version, fast,

Using someone else's vertical software can help you avoid reinventing the wheel.

larger-capacity disks are now available, and the 68000 processor is sufficiently powerful for most business applications.

Both the II and the Mac also benefit as vertical solutions from Apple's strong backing of local dealers and its support infrastructure. Many vertical-system buyers are computer neophytes or people who don't want to fool with the hardware—and when something goes wrong they want a quick fix. If a vertical program becomes essential to your business, you can't afford to wait for mail-order or factory service.

Other machines—notably the IBM PC and its clones, which have the benefit of mass installations—have their own advantages, and much vertical-market software is written in a high-level language and then ported to two or three very different computer systems. Not all software translates well, however, particularly Mac-oriented products that make extensive use of graphics, the mouse, and /or the QuickDraw routines.

Regardless of the machine, the important part is that using someone else's vertical software can not only help you avoid reinventing the wheel, but it can also have the computer automatically turn the shaft. If you're the first to make the journey, you may be able to sell someone else your methods and let them help finance your personal trip. ✚

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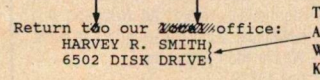

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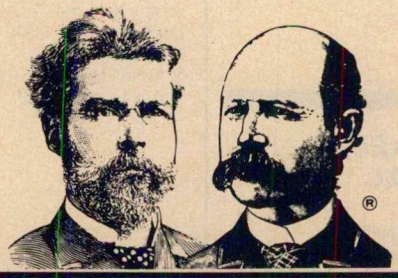

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1	ALWAYS

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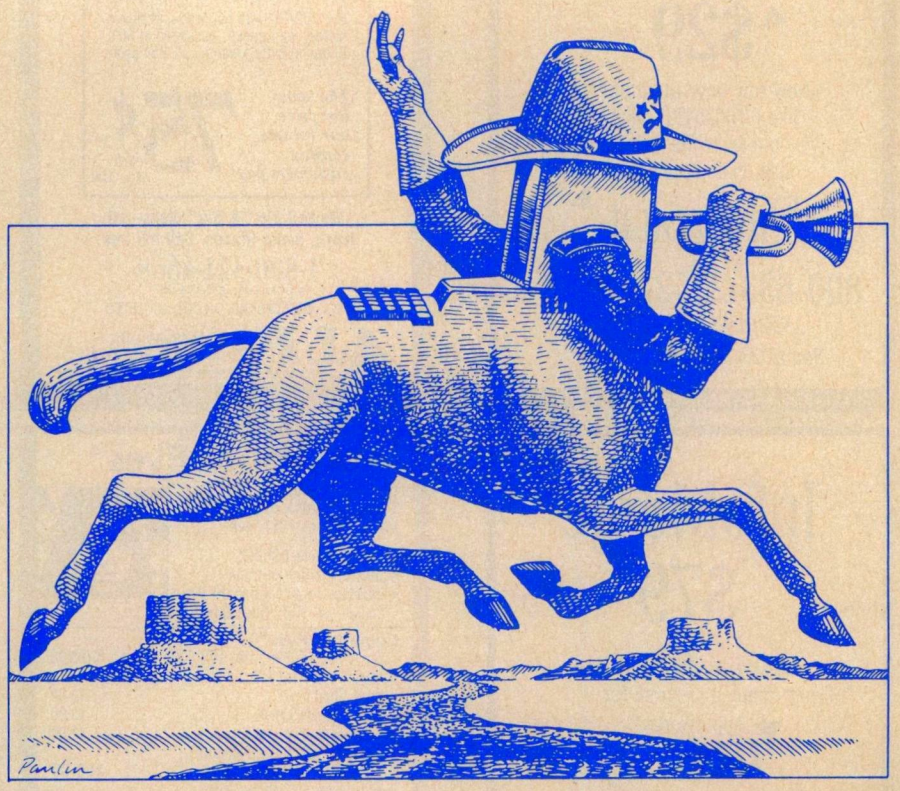
BY GARY B. LITTLE



UNIDISK 3.5 ON THE IIc

Q. *I'm interested in buying a UniDisk 3.5 for my IIc. Will I run into any compatibility problems?*

A. Using a UniDisk 3.5 with your IIc is easy if you have a IIc manufactured in the last eight months or so. Simply attach it to the external-drive port on the IIc's back panel, and you're ready to go (with ProDOS and Pascal 1.3 programs at least). You can even add a second one by plugging it into the connector on the back of the first, in a process called daisy-chaining.

If you have an early IIc, however, you'll have to upgrade your ROMs before you can use the UniDisk. Your dealer will perform this upgrade when you buy the UniDisk.

The new ROMs contain the code that lets programs transfer data between memory and the 3.5-inch disk medium. They also add some nice new features unrelated to the UniDisk, such as the monitor Step and Trace commands, the miniassembler, and the system diagnostics of the enhanced IIe. The ROMs also incorporate fixes for a few minor bugs. For a detailed description of the new features and a complete listing of the programs in the ROM, refer to *Apple IIc Programmer's Guide to the 3.5 ROM* (Apple product #A2L4037).

Once you've added the UniDisk to the IIc, you can boot from it directly by turning on the IIc with the internal-drive door open. Alternatively, you can enter PR#5 from the Applesoft Command mode.

The UniDisk 3.5 works nicely with ProDOS- and Pascal 1.3-based programs. If you use a lot of DOS 3.3 programs, however, you won't be very happy, because Apple has not tried to make the UniDisk compatible with DOS 3.3. Fortunately, some third parties have developed programs to patch DOS 3.3 so it thinks a single 3.5-inch disk is actually two 400K floppy disks. Try UniDOS 3.3 from MicroSPARC, Inc., 45 Winthrop Street, Concord, MA 01742 ($50) or AmDOS 3.5 from RMS Software, Inc., #210—131 Water Street, Vancouver, BC, Canada V6B 4M3 ($15).

I have not heard of a similar program for the CP/M operating system. Given the large number of CP/M users (even on the IIc), I suspect we won't have to wait long for one to arrive. Developers take note!

BULLETIN-BOARD SOFTWARE FOR THE II

Q. *Is any BBS (bulletin-board system) software available for the Apple II that works with the Hayes Smartmodem?*

A. I'm aware of three programs that meet your requirements. The first is Rusty Hodge's SnAPP Electronic Messaging System (1161 North Tustin Avenue, Orange, CA 92667; [714] 998-0607). It sells for only $39.95 but includes several advanced features such as an electronic-mail module; a message editor; and the ability to customize most of its prompts, menus, and commands.

Another BBS program is Greg Schaefer's GBBS Pro. Like SnAPP, GBBS can be modified to suit your requirements and has electronic-mail capabilities. Other nice features are the abilities to configure the system to act as several independent boards, to install "voting booths" in which users can participate in polls and surveys, and to exchange files using the XMODEM error-detection and -correction protocol.

GBBS Pro is available from Micro Data Products, 5739 South Olathe Court, Aurora, CO 80015; (303) 699-1161. The introductory price is $95 for either the DOS 3.3 or the ProDOS version. If you want to sample the system, call the Aurora Net bulletin board at (303) 680-9292.

The other full-featured program is Let's Talk, available from Russ Systems, 320 Dufour, Santa Cruz, CA 95060; (408) 427-1540. Steve Russ' messaging system includes password protection, electronic mailboxes, and an editor for customizing and creating your on-line presentation. The price is $175 for a ProDOS version. You can sample the system by calling (408) 427-0310. +

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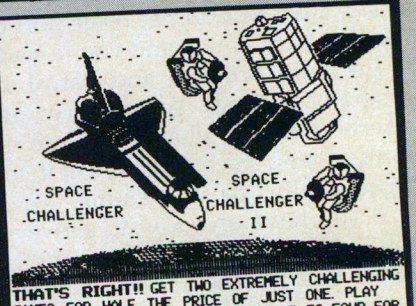

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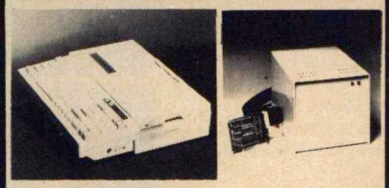

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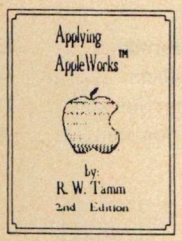

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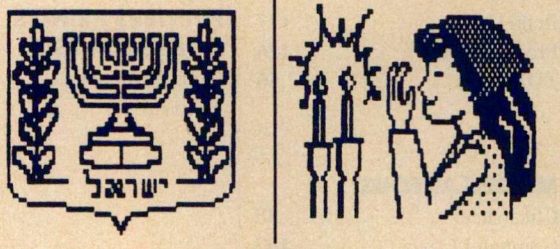

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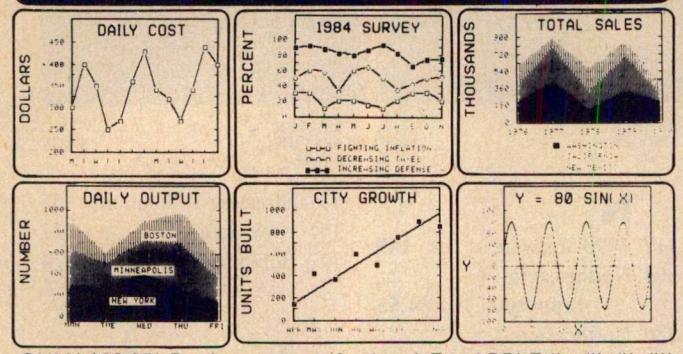

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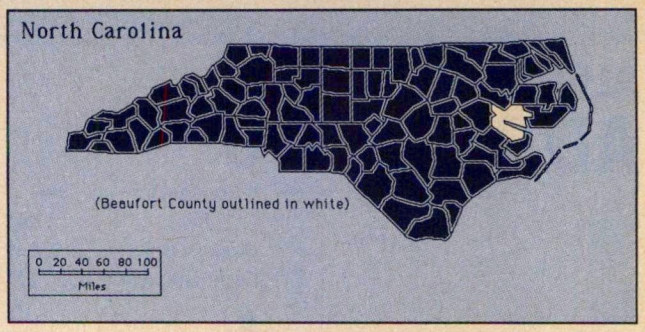

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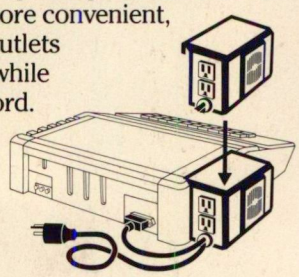

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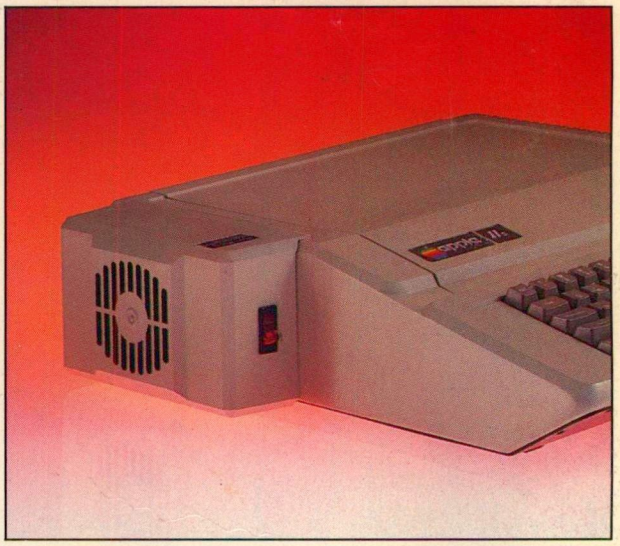
Impurities in the power supply cause 70-90% of all microcomputer malfunctions. Line noise can be interpreted as data, confusing your Apple and causing annoying system errors. Power surges and spikes can do costly damage to your computer's delicate circuitry.

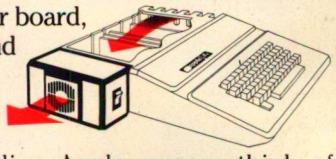
System Saver clips surges and spikes at a safe level and filters out line noise. It makes your Apple more accurate, more efficient and more reliable.

System Saver keeps your Apple cool.

Peripheral cards added to your Apple not only generate heat, they block any natural air flow through the computer. The resulting high temperature conditions can potentially shorten the lives of both your Apple and your peripheral cards.



System Saver's quiet fan draws a breath of fresh air across the Apple's mother board, over the power supply and out the side ventilation slots at the rate of 17 cubic feet per minute.



More than 1/4 million Apple owners think of System Saver as the piece Apple forgot. And 1/4 million well-protected Apples agree.

For a dealer near you, or to speak to a Kensington sales representative, call toll free (800) 535-4242 In NY (212) 475-5200.

KENSINGTON™

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Also available in 220/240 Volts, 50/60 Hz.

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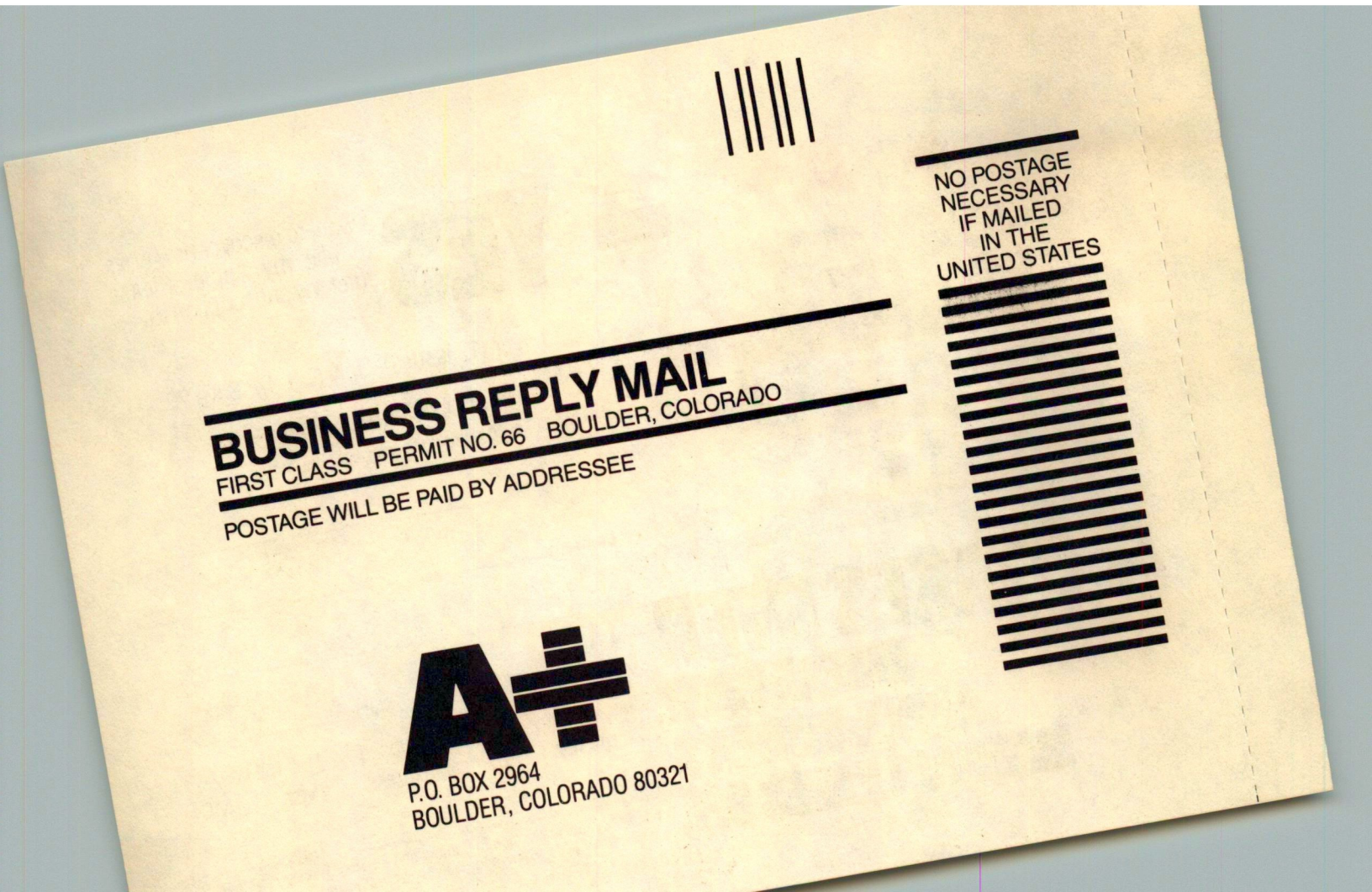
CIRCLE 134 ON READER SERVICE CARD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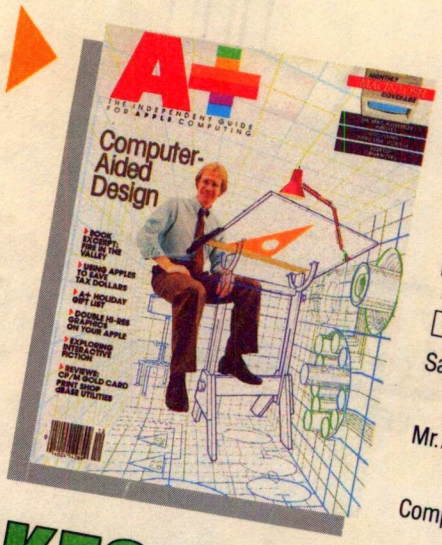

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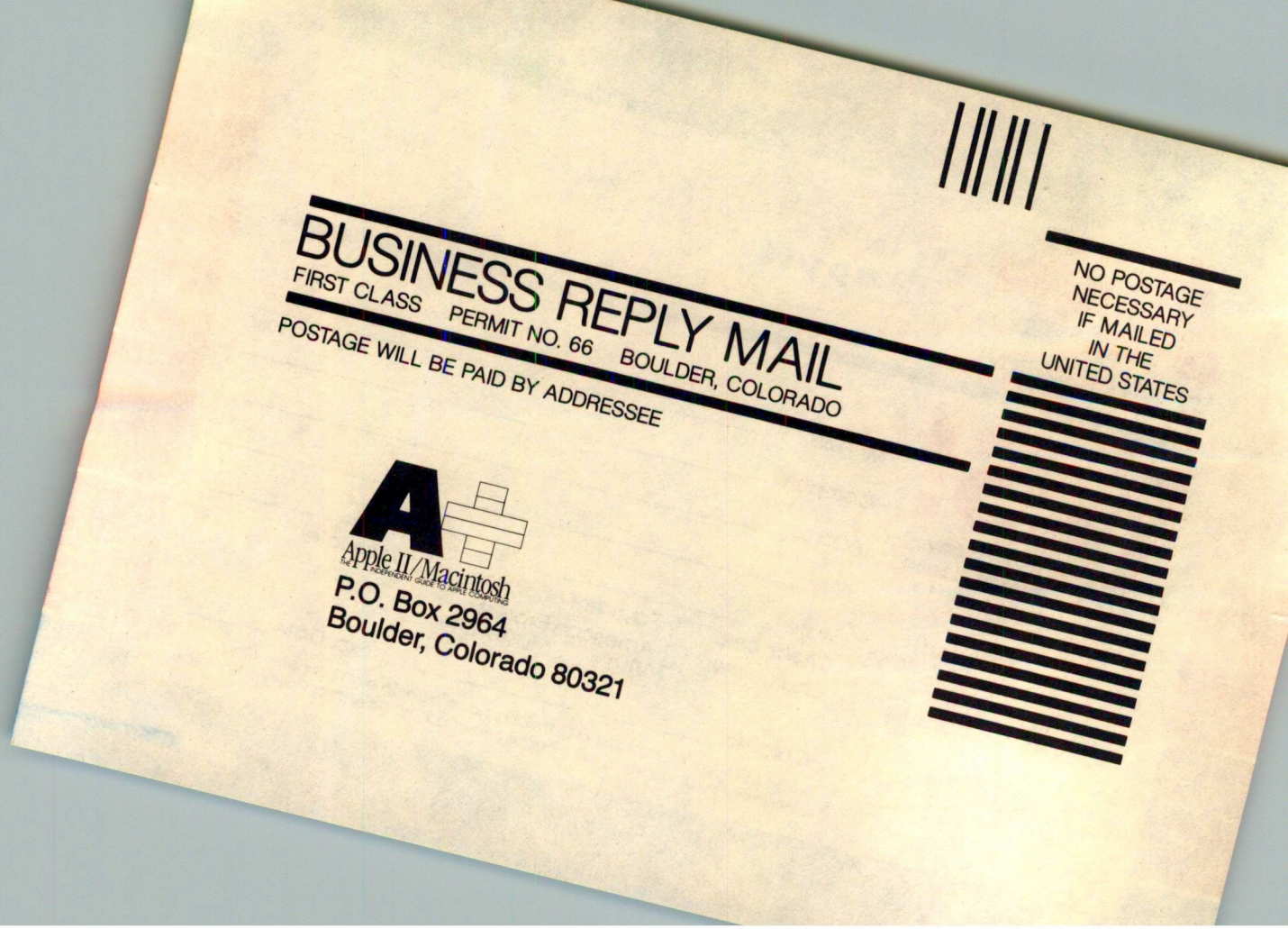
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